POPULAR AVIATION

A Magazine for Everyone Interested in GLIDERS LIGHTPLANES MODELS

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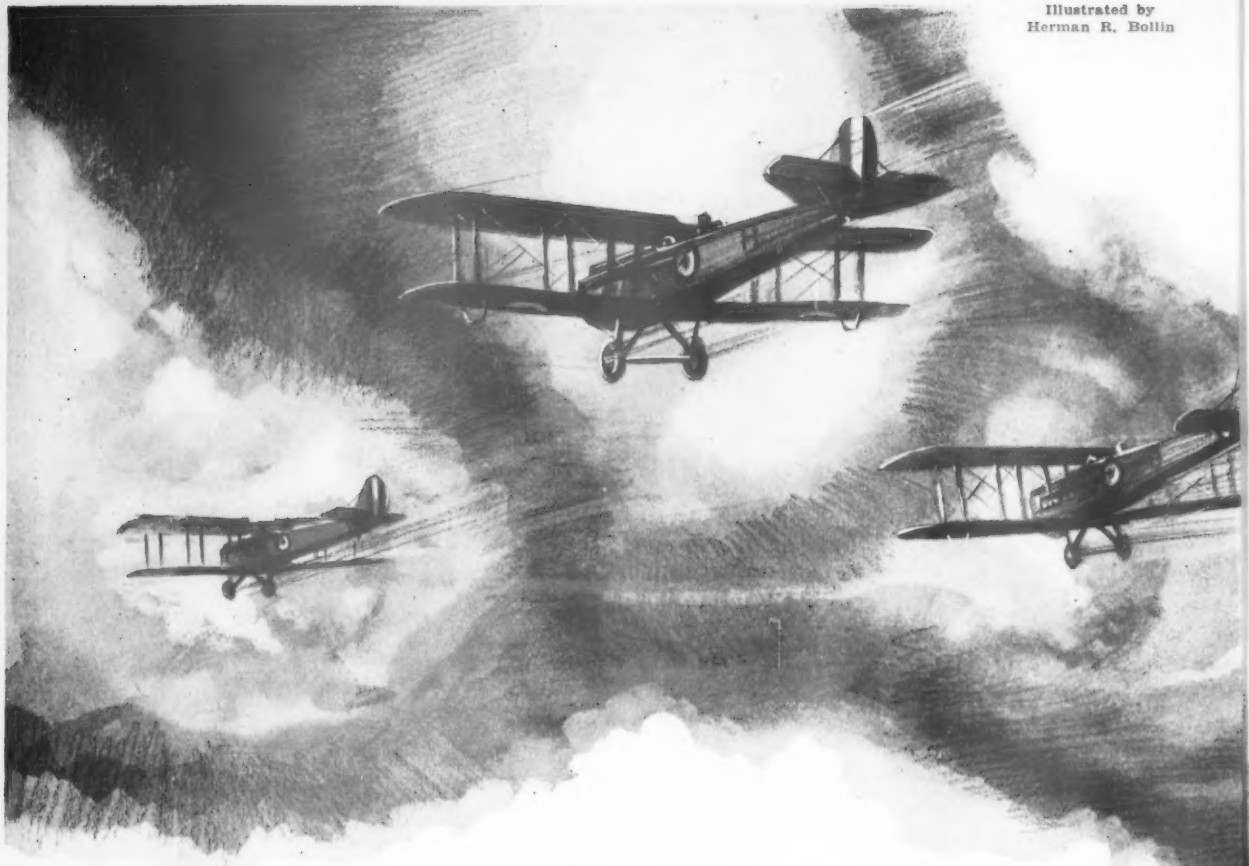


Illustrated by
Herman R. Bollin

"Stand By to Bomb Mouzon"

A thrilling episode in the war record of Lieut. Gardner H. Fiske

by LIEUT. JAMES M. RICHARDSON, D.S.C.

CERTAIN psychologists since the war have had a great deal to say about courage. Courage, according to their theory, is for the most part a negative quality. The man in war time who showed high courage simply had no fear in his make-up.

This particular theory scarcely accounts for the entirely different reactions of the same man to different sets of conditions, each of which requires daring. Nor is it complimentary to that intelligence which one might like to think places devotion to an ideal ahead of safety.

In the Air Service, during the war, there were some very notable examples of athletes with fine records on track and football field who, nevertheless, cracked severely from the strain of flying and the thought of coming face to face with the enemy. And there were others with no athletic accomplishments who showed magnificent intrepidity. It is to one of the latter that I dedicate this account.

It was in August, 1917, that I first met Gardner H. Fiske. He was stationed at Essington, Pennsylvania, on the Delaware River and was trying to learn to fly seaplanes at the old Philadelphia School of Aviation, which had been turned over to the Army for training purposes.

The station was equipped with an F-boat, an old Curtiss pusher on a single pontoon—called by the cadets, "the flying coffin," two N-9s and a fleet of old machines that would have flown about as quickly as box cars.

Fiske had been receiving instructions in flying about two months prior to my arrival at Essington, and it was reported that he was a backward pupil. The instructors shook their heads and said he didn't seem to get the hang of it. But Fiske persisted and one day his instructor let him go solo in an N-9.

That flight is still talked about by old Essington airmen when they get together. Seaplanes of the old type were harder to fly than land machines: they did not respond so quickly to the controls. And Fiske seemed to put his plane in positions from which no one had ever seen a seaplane recover.

On turns he would hold the nose up until a stall or spin seemed sure; on glides he came down like an elevator. Nobody who saw him put his machine in these impossible positions could get control of his nervous system for an hour. It was a harrowing performance, and it was found when he landed that he was oblivious of the danger.

The next day Fiske tried it again, and if such was possible he did worse. Coming down to land, he made a landing forty feet in the air; that is, he levelled off at forty feet and dropped the rest of the distance, hitting the Delaware River with a terrific thud.

The result of the two solo flights was a conference of all the best flying brains to consider Fiske's case and prescribe a remedy. "He just hasn't got the knack and can't seem to get it," said one.

XUM

"I don't think he's got any sense of balance," another said. "What we should do is tell him so and have him removed from flying, or I fear the worst."

Finally it was agreed to tell Fiske of the danger to himself in flying, of the bare possibility that he had no sense of balance and might get a plane on its side—or even on its back—while thinking it was in a perfectly normal line of flight.

Did that succeed? It did not. The next day Fiske came back for more, and he came back with such vehemence that not even his enemies denied him that beautiful quality called "guts." Fortunately, at this time, the autumn winds began to make the river excessively rough, so that flying was discontinued. Fiske was commissioned and ordered overseas on November 1. In France, Fiske went to Issoudun.

IT WILL never be known with what mingled emotions Fiske looked at his first 15-meter Nieuport, a trim, beautiful machine with round, shallow cowl, Le Rhone rotary motor, V-shaped struts and tubular fuselage. In the air it was a thing of graceful motion when touched with the hand of a skillful pilot. But in the strong-arm grasp of the muddled or faltering it was often the instrument of swift and horrible death.

Compared to the unresponsive seaplanes Fiske had flown, the Nieuports were things of violent contrast. It was the difference between a balky mule which almost refuses to turn a corner and a thoroughbred that dashes around at the touch of the rein; the difference between a clumsy-footed stolid stevedore and a graceful danseuse, for the Nieuport was a machine of whim and caprice, not always responding even to the master, and to the uninitiated a mystery and source of destruction forever.

No one in authority at Issoudun knew Fiske's record at Essington or knew his shortcomings as a pilot, so at length he found himself scheduled for instruction. It hardly seems possible that Fiske failed to realize he lacked sense of balance, that sixth sense indispensable in flying. In fact, it is a fair assumption that his keenness for flying and unusual daring led him to keep on trying in spite of the obvious danger to himself.

Fiske's career at Issoudun was unusual. It is reported that he crashed three machines in quick succession, that he came out without a scratch—almost a miracle, that he objected strenuously to his removal from flying duty.

These facts in Fiske's case place him forever in that small category of superbly courageous men who are the grand luminaries in Air Service history. It was too bad that certain others with a perfect sense of balance could not be infected with his bravery.

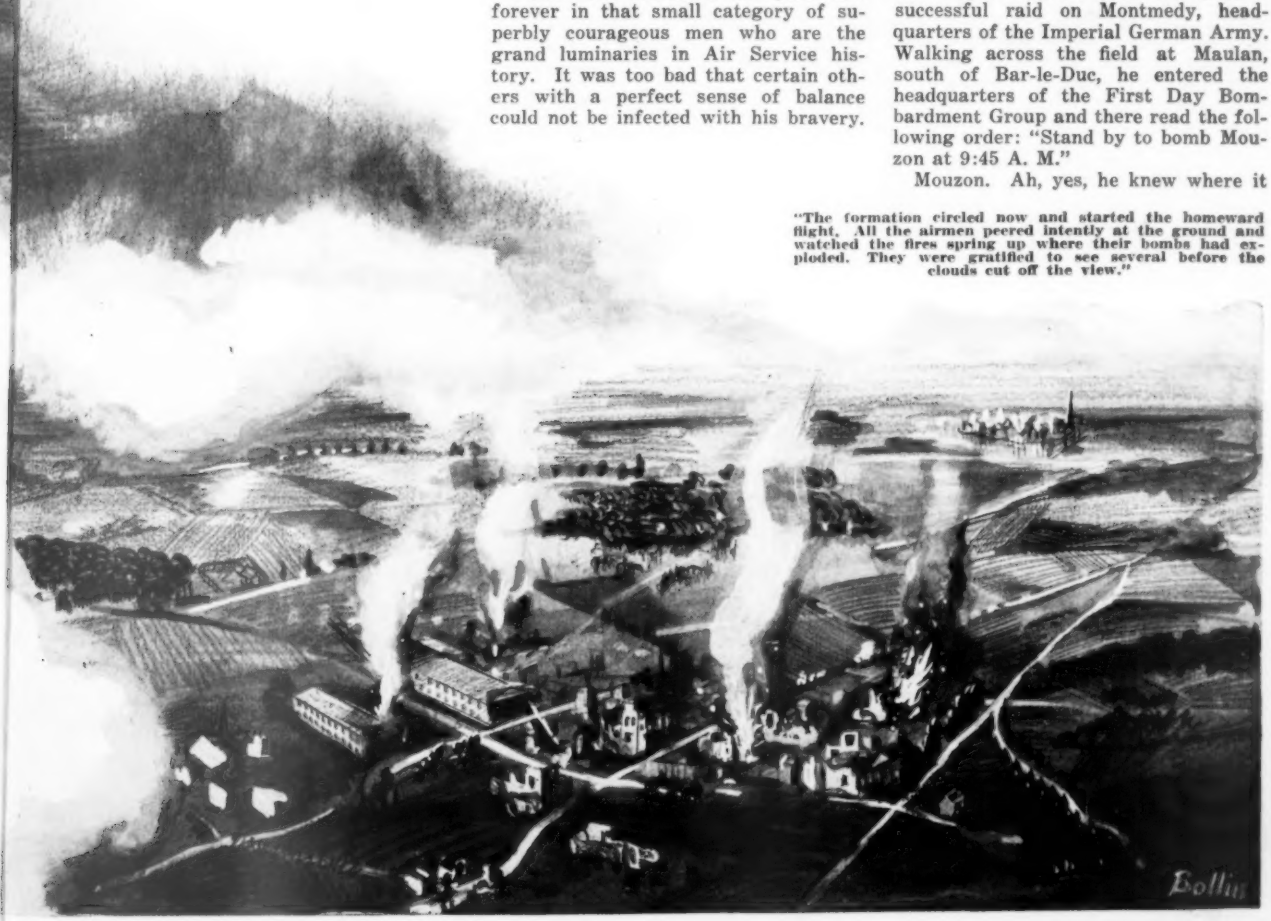
It was a severe blow to Fiske when they forbade him to fly. From a certain angle it almost seemed lack of appreciation of splendid courage. And for every airman his case was replete with drama when, denied the right to try to pilot his own plane, he calmly announced that he had come to France to fly, so, if he couldn't fly his own machine, he would become an observer and fly with somebody else.

Fiske was one of the original quota of pilots and observers sent to the 20th Squadron day bombers when it began operations. He was along on most of their raids, battling sternly and furiously, seeing his comrades shot down all around him, coming home with his plane pulverized with bullets; somehow, though, either through luck or skill, managing to reach home uninjured.

In November, 1918, we find him a veteran in bombing operations. He had participated in two trips as observer of a two-seater fighting plane and had taken part in thirteen bombing raids, acting in five of them as flight leader. And all of this between the dates of September 12, when the 20th reached the front, and November 4—a short period ordinarily but a long, long span for a man in day-bombardment work.

No doubt Fiske was feeling the strain that night of November 4th after a successful raid on Montmedy, headquarters of the Imperial German Army. Walking across the field at Maulan, south of Bar-le-Duc, he entered the headquarters of the First Day Bombardment Group and there read the following order: "Stand by to bomb Mouzon at 9:45 A. M."

Mouzon. Ah, yes, he knew where it



"The formation circled now and started the homeward flight. All the airmen peered intently at the ground and watched the fires spring up where their bombs had exploded. They were gratified to see several before the clouds cut off the view."

was—up on the Meuse river northeast of Montmedy. About fifteen kilometers in enemy territory now. Not far away was Sedan to which the German army was being pushed by the giant strokes of a young and vigorous American army that fought in its own way and paid the penalty.

But Fiske knew it couldn't last long. Day after day he had seen the Germans hurled back, and he knew they were fighting bitterly but retreating under the cover of it. But how long would it last? What of tomorrow and the next day and the day thereafter?

Mass formations of Fokkers were hanging just back of the German lines now, covering the retreat. It was American day bombers that they still concentrated on—day bombers that could rip the heart out of a town filled with troops, destroy a railroad junction and tie up trains for hours. As American bombers increased in number, giving a fair idea of our growing air forces, the Germans were bringing more and more fighting planes to withstand them.

FISKE was soon joined here in headquarters by the flight leaders of the 20th Squadron and the operations' officer. Diligently they searched a large scale map of Mouzon and looked at all available aerial photographs of the city and vicinity.

There was other general information at hand. A thorough study disclosed the objects of military value: the principal part of the city was situated on the east bank of the Meuse, on the west bank were a railroad station and great warehouses. They decided their aim should be to drop bombs on these warehouses and the railroad. So much for that; everybody finally went to bed.

The days were becoming very short in November. To make a 9:45 raid meant crawling out of bed at dawn, and the next morning they did, shivering as they drew on their clothes and ran over to breakfast, prepared while they were still asleep.

The weather looked none too good, but preparations were made anyhow. After breakfast all the flight gathered together and received final instructions on the way the bombers should group themselves. If the weather permitted a raid, they would form in three "V" formations, one from each of the squadrons participating.

The 166th Squadron, a late arrival at the front, would lead the parade, then Fiske's squadron, the 20th, and on the tail end would be the 11th. The formations would come together over the airdrome at 7,000 feet, take the places assigned them, and climb all the way to the front, probably reaching an altitude of 14,000 feet by the time they crossed the lines.

Fiske and his mates gathered on the outside. A shrill November wind swirled across the airdrome. Low mists hung in the valley. A poor day thus far. Ten minutes later there was a different story: the sun had appeared; the mists faded as if by magic; there

"Fiske's bursts crashed into the Fokker. . . ."

would surely be a raid. The certainty on this point brought the period of greatest stress—that moment as the aviator nervously dressed himself in flying clothes, climbed into his machine and tried to keep himself busy until the roar of the motor came to bring back his assurance.

There was nothing in the world that an aviator was so thankful for as the roar of a motor. The even, throbbing purr of a powerful engine quieted his nerves and brought every ounce of his courage surging to his assistance. It is unbelievable, admitting that an airplane could have been operated by a perfectly silent motor, that any war aviator would have changed to the silent type.

Fiske was to be flight leader in the raid on Mouzon. He crawled into the rear cockpit of the slim, grey De Havilland, tested his guns and Verys pistols, checked up on all the different paraphernalia that the bombers relied on. The bombs had already been placed in

". . . . the great old Fokker trick of hanging on the propeller and firing point blank."

the racks of the planes, standing wing-tip to wing-tip in a line across the field.

Fiske could see the other observers and pilots climbing into their planes. All at once he hard a muffled explosion, and saw a green ball of fire, thrown from a Verys pistol, rise into the air. At this signal all the mechanics swung their propellers, there was a deafening din, the powerful Liberty motors had been made to live and were throwing the propellers until they looked like dim round blurs.

When everybody was satisfied that his motor was warm enough, a single red ball from a Verys pistol gave the signal for the bombers to take the air. They taxied their planes around to the position on the ground that they would have in the air.

Fiske's pilot in number 1 opened his throttle, the plane shot forward, the tail came up to a horizontal position, the plane bounced a couple of times and rode into the air. Behind came number 2 on one side, number 3 on the other, flying neck to neck. Then 4 and 5 and so on until number 9, the last one of their individual "V" formation was in the air.

The climb preceding bombing raids was a laborious process. It required an hour for the powerful Liberty motor to pull a heavily loaded De Havilland plane to 7,000 feet, the altitude one reached before swinging into final formation for the jump across the lines. It was too bad that such a splendid motor as the Liberty was not utilized in a stronger, safer plane than the DeHavilland 4.

During the tiresome climb Fiske divided his time between further testing of the sights, examination of his Verys pistols and study of the map. When they first left the ground, he could plainly see the trees which were losing their leaves and growing gaunt on the approach of winter. Higher up he could see much further, and all the objects on the ground flattened out until everything seemed of equal height. Around him were his own machines, spread out. He watched them ride the bumps of the high wind, looked at the places where he knew their propellers were whirling, saw only the vague circular outlines of them.

AT LAST the needle on the altimeter hit 7,000 feet, the plane wheeled about in a wide turn, and Fiske saw the others circle in behind. Out ahead and below he saw the flight from the 166th Squadron turn for the lines. His plane dropped in behind, and the bombing fleet was on its way to Mouzon.

First they passed over Bar-le-Duc, then Rembercourt. On the left Fiske could see the vast expanse of the Argonne woods and the Aire river which looked like a silver string. On his right were the Meuse and Verdun. The altimeter needle was still creeping up, but in spite of the fact that they were climbing the high wind at their backs bore them rapidly along.

They kept the Meuse river on their

(*Continued on page* 64)

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A Radical Foot-Propelled Glider

A UNICYCLE glider has been patented by Joseph Szakacs, of Lincoln, Nebraska. Its main-frame is contained within a single big rubber-tired wheel, the rim of which carries side flanges that are provided with gear teeth. The operator sits inside of the big wheel, on a saddle, and drives it with pedals, the latter turning a crosswise shaft which actuates a toothed wheel that, through gears, intermeshes with the teeth carried by the rim flanges.

The operation of the pedals at the same time rotates a propeller at the front of the big wheel. Above the latter, supported by upward extensions of the frame, is a transverse plane, while rearward extensions of the frame support a rudder and elevator. The rudder and elevator are controlled by cords extending from them over guide rollers to handle-bars grasped by the operator.

By turning the handle-bars to the right or left he turns the rudder; by lifting or lowering them he exerts a leverage which raises or lowers the elevator. When, by use of the pedals, the operator has gained sufficient speed, the overhead plane is expected to lift the machine and himself.

Asbestos Rescue Suit for Plane Crashes

INTRODUCING the latest safety device in the United States naval air force. It is being used on the giant navy airplane carriers and consists of an asbestos suit which is worn by one of the bluejackets of the carrier's crew.

During maneuvers, this sailor must be ready to dash into the flaming wreckage of a plane to save the aviator's life in case of accident in landing or taking off from the flight deck. It looks like a hot job, even if no plane takes fire.

This Glider Crossed the English Channel

TO Herr Robert Kronfeld, famous German glider pilot, belongs the honor of the first return trip across the English channel in a glider. Piloting his "Wien," Herr Kronfeld took off from St. Inglevert Aerdrome, Calais, and landed at Swingate, near Dover.

Shortly after landing he began the return journey, reaching St. Inglevert at night. The photograph shows Herr Kronfeld (left) chatting with friends at Calais before the takeoff.

Harvard Has Finest College Flying Club

THE Harvard Flying Club has been awarded first prize for the second consecutive year in the Grover Loening Intercollegiate Flying Contest. New York University Flying Club won second prize and the University of Detroit Flying Club third prize in this annual competition, in which aviation clubs of universities and colleges throughout the United States took part.

The Grover Loening Intercollegiate Flying Contest was established in 1929 to encourage college students to learn to fly in power-driven airplanes. Grover Loening, builder of the famous amphibian planes, is the donor of the trophy and of the annual cash awards. In establishing this contest Mr. Loening said: "The best time to train students for aviation is at the ages when they attend college. I feel that anything that can be done during this period to increase the number of pilots among college men will not only help in the development of civil aviation in the United States but will also give a background for flying officers for possible military expansion."

Interest in college flying has been greatly stimulated as a result of the Loening Competition. Each year the Contest Committee reviews the activity of college flying clubs throughout the country and selects the prize winners on the basis of each club's success in getting student members in the air as pilots and student pilots.

The Harvard Flying Club has an enviable record. It is the oldest college flying organization and the only one to own planes outright. The club now has two airplanes, one of which is used for student training. The membership includes 40 licensed pilots who during the past year have put in a total of 1,448 flying hours.

New York University, winner of the second prize, has ten members flying regularly and a number who are student pilots. The University of Detroit Flying Club has a total of thirty members, seven of whom have pilot ratings.

Flying Boat Autogiros Planned

BROADENED development in the autogyro is indicated from many angles. The device of rotating vanes, which is the autogiro's chief characteristic, is to be applied to cabin airplanes, float seaplanes and flying boats in Great Britain. The effect on design as well as on operational methods, if the new applications prove successful, may be very great.

The autogiro system was adapted a year ago to the seaplane in experiments, and the first result has been an order by the French Government for two autogiro float seaplanes, fitted with Renault engines, for service with the fleet on reconnaissance duties of the particular type for which semi-rigid dirigibles have been largely used hitherto.

The seaplane as tried out was found to be most satisfactory. It took off easily and alighted well, even on rather rough water. The success of those experiments is to lead to the construction of an autogiro flying boat. Messrs. Short Brothers are co-operating with the Cierva firm in the production of this model, which must, of course, be experimental.

Steps also have been taken for the construction by the De Haviland firm of an autogiro version of the Puss Moth cabin monoplane. This, it is hoped, will combine the high performance of the Puss Moth with the low landing speed and freedom from stalling of the giro

An Interesting English Lightplane

The Comper "Swift" is a single seat monoplane and gives excellent performance with relatively low power.

AN INTERESTING example of the latest type of light English aircraft is the Comper "Swift." It is a single seater monoplane capable of being fitted with any of three different engines, namely, the 40 h. p. A. B. C. Scorpion engine, the 50 h. p. British Salmson radial engine, and the 75 h. p. Pobjoy radial engine.

The A. B. C. Swift does 32 miles to the gallon, has a climb of 600 ft. per minute, a top speed of 100 m.p.h., a cruising speed of 85-90 m.p.h., and a landing speed of 35 m.p.h. The cruising range is 360 miles.

The Salmson Swift does 24 miles to the gallon and has a climb of 600 ft. per minute, a top speed of 115 m.p.h., a cruising speed of 100 m.p.h., and a landing speed of 35 m.p.h. The range is 300 miles at cruising speed.

The Pobjoy Swift has been designed for the owner pilot who requires an exceptionally fast aircraft for touring purposes or for small merchandise transportation. It does 18 miles to the gallon, has a top speed of 145 m.p.h., a climb of 1,400 ft. per minute, a cruising speed of 125 m.p.h., and a landing speed of 40 m.p.h. The duration of flight without refueling is 360 miles at cruising speed.

All models are high wing braced monoplanes of extremely strong construction. The wing chord is level with the pilot's eyes, and the fuselage which supports the wing is so arranged that by a slight inclination of the head the pilot can see directly ahead on either side, thus leaving no blind spot whichever direction is faced.

Housing is one of the problems to be solved before the use of airplanes becomes general, and it is interesting in this connection to note that the Swift can be housed comfortably in any shed nine feet wide and nineteen feet long. The wings fold by the one operation of with-drawing two locking pins from the front spar. No disconnection of aileron controls is necessary and no jury struts are required. (Total time required to fold wings, 30 seconds.)

Dimensions of the machine are: Span, twenty-four feet; length, eighteen feet four inches; height, five feet seven inches. Dimensions when folded, eight feet six inches wide.

The fuselage is in three portions bolted together, a feature which minimizes repair, replacement, and transport costs. These portions are fabricated as separate units, each being attached by four bolts; consequently, any major adjustment or inspection is an easy matter, and, once assembled again, the joint between these portions is covered with a narrow strip of fabric. This eliminates the expensive methods involved where the entire fabric has to be stripped for access.

Famous Flyer Invents Ground Speed Meter

HAROLD GATTY, co-pilot with Wiley Post on the recent round the world flight used an ingenious device which he invented for telling the ground speed of a plane in flight. Unlike similar indicators, it can be used over unbroken sea, or even above fog and cloud banks.

The operator looks down at the land or sea through a transparent film which moves at a known constant speed, and adjusts the distance of an eyepiece above the film until both the film and the earth's surface appear to be moving at the same speed. The altitude of the plane and the distance from the eyepiece of the film furnish an equation which gives the actual rate at which the plane is traveling toward its objective.

Ancient Plane Goes for a Solo Joy Ride

AN antiquated army ship, apparently jealous of the attention centered on aviation's newest invention, attempted to steal the show from Mrs. Amelia Earhart Putnam and her autogiro at the charity aerial circus held recently at Oklahoma City, Oklahoma.

While the biplane, a Canuck owned by Charles Smith of Pauls Valley, was being cranked at the field where 10,000 persons were assembled, the throttle slipped open. Careening dizzily about the field, the plane threatened to wreck the place until a lariat and pistol shots brought it under control.

One man was slightly injured when his lariat, thrown over a wing, dragged him several feet. The plane was not damaged, and it was back at the hangar the next day.

Unique Shroud Increases Propeller Efficiency

FORCING air into the propeller which otherwise would not be within its range of action, a propeller "shroud," invented by James M. Funk, aerodynamic expert and pilot, is expected to make airplanes independent of existing air conditions.

The "shroud," an adjustable airplane wing completely circumscribing the propeller and within which the propeller revolves, acts like a large funnel, concentrating air from a large area into the comparatively small area in which the propeller operates. As a result, despite air conditions, the propeller is always provided with air of a constant density, enabling it to pull with a steady, even power and making it many times more efficient and safe than the propeller which pulls one minute and spins the next.

Wind tunnel tests of the device at the United States navy yard showed the propeller's thrust, using equal power, to be double that of a propeller not equipped with the "shroud." Tests made with the sanction of the Society of Automotive Engineers showed a two hundred and forty-three per cent increase in propeller efficiency when the shroud was in place.

An automatic control device opens and closes the shroud as the density of the air varies, a control made necessary by the fact that no pilot is able to sense

A model plane equipped with the propeller shroud.

changing density of the air until after its effect is apparent and also by the fact that density changes almost constantly and instantly. The control steadily maintains an angle relative to the density of the air and it functions at the least sign of change.

The conventional propeller, the result of many years of constant research and development by the world's most brilliant minds, functions alone with a relatively high degree of efficiency in the laboratory under ideal conditions, but the conditions under which it has to work while in steady use are constantly changing. As a result, the efficiency of the conventional propeller, designed for one set of conditions, is affected by any change in conditions and the only way the efficiency can be maintained is by changing all of the propeller's geometrical particulars at the same time or by maintaining a constant air condition in the propeller environment.

(*Continued on page* 53)

XUM

Must a Pilot Be Perfect?

"Not at all," says this author. "Most of the physical and psychological tests for pilots are the bunk."

by BOGART ROGERS

I HAVE just read an article by a serious-minded aviation expert explaining in detail the physical, mental and moral qualifications necessary for the young man who wishes to become a first class pilot. In brief, it solemnly declares he must be a combination Frank Merriwell, Rhodes scholar and Thomas A. Edison—and good to his mother.

Not that I don't think a young man should be good to his mother—but it gave me a pain. All similar articles on the subject, and there have been many of late, give me a pain.

I wonder how the learned gentlemen who write these articles are going to explain how Wiley Post—in the pilot's seat every mile of the way—managed to make his record-breaking flight around the world without busting his neck? Wiley Post, you see, has only one eye—and the experts maintain a man with only one eye should keep entirely away from airplanes.

The Army Air Corps won't waste five seconds with a man blind in one eye. The Aeronautics Branch of the Department of Commerce, which issues licenses to civilian fliers, doesn't think much of men who are optically only half there. The flight surgeons—bless their little hearts—will tell you no man with but half of his normal looking equipment can possibly become a great flier—or even a good flier. They say he shouldn't be permitted to fly a plane at all. He can have no judgment of distance or speed. The poor fellow is a cinch to be killed.

Wiley Post, they will declare—because they'll have to have some sort of an alibi—is the exception that proves the rule.

A casual perusal of aviation history reveals so many similar exceptions—so many famous fliers whose physical defects would bar them from the air under modern standards—that it makes you wonder if all the rules and regulations are worth much after all.

There was, to begin with, Major Edward Mannock, the brilliant Irishman whose name surmounts the list of British aces—even above the names of Bishop, McCudden and Ball. The official records show Mannock destroyed seventy-three enemy planes. He was, like Wiley Post, blind in one eye. He could shoot with the deadly aim of an Annie Oakley, see and identify enemy planes when they were mere pinpoints in the distant sky, report ground activities with the accuracy of the finest observer and lead patrols with rare skill.

Not only was Mannock a great fighter but an excellent flier, as well. Those who knew him claim his record could have been double what it was—if he had wished it to be. He preferred, however, to give other pilots under his command a chance to fatten their scores. He frequently took newcomers out and helped them achieve their first victory. "Mick," as he was everywhere known, didn't care where the credit went just as long as the enemy plane was destroyed.

And all with one eye.

Georges Guynemer was the greatest of the French aces. Rene Fonck surpassed him in number of victories but Guynemer developed the tactics and invented the deadly one-pounder aerial cannon with which Fonck carried on. And Guynemer was as poor a physical specimen as ever took the air. Because of bodily disabilities he was repeatedly rejected when he first tried to enlist—and if a man was refused by the French army in those trying days he was unhealthy indeed. He finally managed to get in as a grease-monkey—and pushed his way forward from there.

Guynemer was frail, nervous, had weak lungs. For occasional long periods he was too sick to fly. He is said to have often had hemorrhages after landing from gruelling flights. He would have been unable to meet the required standards of today, either military or commercial, and yet he is among the immortals in France's Pantheon, a physical misfit who became the greatest single French hero of the war.

CAPTAIN BILL PACE was a flight commander with the British Independent Air Force which, operating from Toul to Nancy, unceasingly bombed the industrial cities of the Rhine. Pace, a Canadian, had been severely gassed in one of the first German chlorine attacks in 1915, invalided out of the army and sent home.

Somehow he managed to get back into the flying corps. His lungs were still in bad condition—he breathed, with obvious difficulty, through his mouth. When a British squadron twice made daring daylight raids on Cologne—the most spectacular daylight raids of the war—Pace was leading the parade. He outlived many bold forays on the Rhine towns—flights in which almost entire British squadrons were shot down—and, ironically, survived the war to die in a trivial automobile accident a few months later.

Captain Pace probably wouldn't have been permitted near an airplane today and yet, with a bad heart and worse lungs, he was one of the greatest bombing pilots of the war.

There is authentic record of several pilots who learned to fly with wooden legs and became highly proficient. They affixed a loop

Wiley Post (left) and Harold Gatty, whose record-breaking world flight is one of the most remarkable feats in history. Yet Post, the pilot, has only one eye.

to the rudder bar, slipped their one foot through it and steered by pushing and pulling, which they could do with all the finesse of a pilot with two sound legs. They claimed, as their distinct advantage, they could be shot in the wooden leg without suffering pain or harm.

There is also authentic record of several excellent one-armed fliers.

Baron von Richthofen, by his own admission, was a "crasher." In his fledgling days he had more than his share of accidents and experienced great difficulty in learning to fly. Eventually he caught the hang of it and became Germany's ace of aces. Under present standards of appraisal he probably would have attained no such prominence. After the second or third crash he would have been classified as unfit to fly pursuit planes.

Many other great war pilots encountered the same difficulty in learning to fly. Only after repeated misfortune did they master the art, subsequently to scale the heights of glory and fame.

Nowadays boys of eighteen, nineteen and even twenty who fly are called "juniors" and extensive publicity is given to their feats in the air. We are led to believe it remarkable that lads of their tender years should conquer the elements with such consummate skill.

Well—

Captain Beauchamp-Proctor, a South African youth who was Great Britain's premier balloon straffer—with a record far surpassing Frank Luke's, although it took him much longer to achieve—was barely eighteen when he watched his first drachen tumble in flames and scarcely twenty when he received the Victoria Cross, England's highest military award.

The great Captain Albert Ball was seventeen when he joined the colors, eighteen when he learned to fly, twenty when he died with forty-four notches in his machine gun—and he never was anything but a little boy. Captain Philip Fullard, another British ace, destroyed forty-eight enemy planes before he was twenty. Guynemer was twenty when his first opponent went spinning down. Captain Andrew E. McKeever, perhaps the finest two-seater pilot in France, had thirty victories to his credit before he was of age. Frank Luke died at twenty.

In fact, the records reveal very few great war pilots who were more than twenty-one or twenty-two—and scores who were still in their teens.

SOME time ago I read an article by a general of high rank who declared discipline must ever remain one of the cardinal virtues of a successful flier.

Tush, tush, general! Did you ever hear of a chap named Frank Luke—the Arizona Balloon Buster—the kid who in two short weeks scored twenty-one spectacular victories, won himself a Congressional Medal of Honor and established a record for daring and destruction that has yet to be surpassed?

Frank Luke, as his history shows, was one of the most undisciplined and insubordinate young men who ever took part in anybody's war. He was generally in trouble with his superiors, more than once on the verge of court martial—and the most amazing American flier of the war.

The British Royal Flying Corps had a fit running-mate for Frank Luke—a Canadian named Claxton, whose given name or initials I cannot recall. During his ground school and early training days Claxton showed almost no inclination for hard work and no overpowering ambition to get to the war. He lagged behind his classmates and seemed to lack the proper respect for authority. Out of a large crowd of student fliers you would probably have picked Claxton as the one least likely to distinguish himself at the profession of arms.

He finally got to France—and the things that boy did when he got there! From the very first day he became one of the most dashing and fearless performers on the Western front. In four short months his official record of victories had climbed almost to the forty mark. He was awarded a captaincy, the Distinguished Flying Cross, the Distinguished Service Order and was well on his way to a Victoria Cross when he was shot down—fortunately to be taken prisoner and not killed.

Claxton was human proof of the old adage that you can't tell by looking at a flea how far it can jump.

And despite all the experts say, you cannot pick a great pilot, military or commercial, by looking at him or by the way he passes his first examinations or conforms to an arbitrary set of rules or standards.

Air fighting and military flying is something for which a pilot, to be successful, must have a zest—a flair. There is no way of telling in advance which man, in the heat and stress of battle, will have the intestinal fortitude, the stout heart and the determination to do or die that were the distinguishing attributes of Rickenbacker, Mannock, Guynemer, Richthofen, Frank Luke and other great fliers of the war.

I never saw or heard of a great fighting pilot who was great and who shot down large quantities of the enemy (which a great pilot is supposed to do) because he was good to his mother, had bulging muscles or could read Virgil in the original Greek. They were great because nature had endowed them with the divine spark, high courage, indominable will and an unquenchable determination to whip the other guy.

You can't discover these qualities in a man by the size of his hat, the color of his college diploma, what he did at Kelly Field or peeking through a gadget at the semi-circular canals of his ears.

The point I make is this:

The experts and authorities—so-

(*Continued on page* 63)

Radio Controls Pilotless Plane

BEFORE a crowd of 5,000 spectators a pilotless monoplane was recently flown successfully by remote control from another plane at the municipal airport at Houston, Texas.

This was the first public demonstration of the principle which was discovered seven years ago by Robert E. Autrey, formerly of Los Angeles, who holds three governmental patents on the invention.

The radioplane, a five place Stinson-Detroiter, had dual controls. Whitey Owen, transport pilot, went aloft in the radio ship to satisfy government standard requiring a licensed pilot when doing experimental flying.

Shortly after taking off Owen plugged in a switch which put the plane in the control of Autrey, who tapped out signals from the guiding plane on his short wave transmitter.

Autrey kept the radioship under his control for fifteen minutes, banking it, dipping it, and turning it at will.

Pilot Owen with the radio plane.

The ships maintained an altitude ranging from 1,000 to 3,000 feet throughout the erperiment. When the two planes landed Owen said he had thrown the switch one time while aloft when Autrey "over-controlled" the radioship while banking.

"It was a queer feeling," Owen declared, "for me to be sitting there with my hands folded and the plane perfoming as though a pilot were at the controls.

"I became frightened the time Autrey banked too quickly," he grinned. "I was afraid of a spin. I grabbed the switch and disconnected the current. As soon as I righted the plane I pushed the switch, reverting it back to Autrey's control."

In operating the radio ship the signals were broadcast from the aerial of the control plane, through the intervening space and picked up by a short wave receiver on the radioship's master control panel. Through the intervention of an ingenious electric circuit, six volt electric motors turned the gears operating the radioship's control rods.

There are 16 different controls on the radioship, which are operated by the coded radio signals. Two and a half seconds is the maximum time needed to operate any control. The equipment aboard the radioplane is so compact that it weighs only 315 pounds.

XUM

High-Speed Mail Service

FAST high-altitude mail-carrying airplanes capable of speeds of more than 200 miles per hour are to be used in the near future upon the Indian and African empire air routes. It is planned that the planes shall fly day and night at heights of 7,000 or 10,000 feet, and that they have a cruising speed, with the engines at normal revolutions, of about 170 miles an hour.

The English view is that the carrying of mails in passenger aircraft has led to delay of the mails. Passengers demand a full night's rest between each stage, and in order to reduce noise and to give the highest possible degree of comfort in the cabin, the cruising speeds of even the newest British passenger machines are not much above 110 miles per hour.

The mail carriers will cruise, therefore, at about 60 miles per hour higher speed. They will also fly at night. The mails will thus travel for about 20 hours out of the 24, and over the entire route they will be able to average speeds which are far beyond the reach of the present machines.

Among the designs submitted are some for single-engined, and twin-engined, and three-engined aircraft, some monoplanes and some biplanes. Speed ranges greater than any previously attained are provided for, so that, despite an extremely high top speed, the aircraft will be able to land slowly. Wheel brakes and air brakes are proposed in many of the designs. The new aircraft will be fitted with radio and will carry "blind" flying instruments, so that they can climb through the clouds and fly above them for great distances.

New Army Planes to Have Slots and Flaps

"SLOTS" and "flaps," flying safety aids concerning which a great deal has been heard at intervals in the development of aviation, are about to make their appearance for the first time in radical military designs of comparatively high speeds. This is occurring almost simultaneously in England and in the United States.

A new attack plane, for "ground-strafing," capable of carrying half a dozen machine guns, possessing a top speed greater than that of the present single-seater pursuit planes and with a relatively short-wing span compensated for by the use of slots and flaps, soon will be tested for the Army Air Corps. The designers of British military planes have already taken up this study, which seeks to offset the high landing speed of short-wing fighters by the use of automatic wing slots.

Curtiss-Wright Shows Loss

FIGURES recently released show that Curtiss-Wright Corporation sustained a loss of about $1,440,000 for the first six months of 1931.

Smithsonian Museum of Famous Planes Again Open

AFTER remaining closed for a considerable period to permit installation of sprinklers and other fire fighting equipment, the aircraft exhibition hall of the Smithsonian Museum at Washington, D. C., which contains many history-making planes, has been reopened to the public.

This photograph shows a general view of the hall. In the foreground on the left is the Curtiss racer in which the late Lieutenant Cy Bettis set a number of records back in 1924 and 1925. On the right is the famous Bremen, first east-to-west transatlantic plane. Next to the Bremen is the Chicago, one of the round-the-world planes of 1924.

Army Pilot Knocked Out by Carbon Monoxide

A RARE instance of an airplane pilot being overcome by monoxide poisoning during flight culminated in a rather trying experience for his companion in his endeavor to take over the control of the airplane to avert a serious disaster.

Two student officers of the Aerial Photography Class at Chanute Field, Rantoul, Ill., were engaged in taking photographs at an altitude of 12,000 feet over Chicago when the photographer sensed that the plane suddenly went into a steep dive, an unusual maneuver for work of this character.

Upon going forward to confer with the pilot regarding the most unusual behavior of the plane, Lieut Olive, photographer, found Lieut. Coates, pilot, in an unconscious condition. He had fallen forward in his seat, his shoulders pressing the control stick forward, with the result that the airplane was diving at a speed of approximately 170 miles an hour.

Vigorously shaking the pilot in an endeavor to arouse him from his stupor and finding this in vain, Lieut. Olive grasped Lieut. Coates and held his unconscious form back into the seat, reaching forward with his right hand while standing behind the seat. Straining on the control stick, he brought the airplane back to fairly normal condition of flight, but in doing so

(*Continued on page* 55)

Inventor Expects Success with New Helicopter

JOHN W. PITTS and W. P. Kindree of Detroit, have invented a type of "windmill" plane expected to rise straight up without even an inch of forward run. It has an umbrella-like propeller to pull it forward after sufficient height has been gained. Air-stability will be insured by means of two small wings.

The machine, called the Pitt helicopter, has a propeller twelve and a half feet in diameter which is made of sixty blades of white ash. The propeller and a 65-horsepower motor are mounted on an axis above the landing gear. It will move up and down the axis with a twenty-four inch reciprocal motion. This action is expected to create an air pressure on the underneath sides of the blades which will overcome the gravitational pull.

Four years ago a Pitt helicopter was made on the same principle but due to the slowness of the reciprocating action would rise only six feet. The present plane weighs 1,500 pounds or 1,200 pounds less than the previous model. The action of the propeller has been speeded up so that it is expected the machine will lift easily to great heights.

The proposed manner of movement is as follows: The motor is started, causing the propeller to revolve slowly. The up-and-down motion is started by means of a clutch. The propeller revolves faster as more power is applied and a great pressure is thereby caused under the blades, with a partial vacuum on the upper sides.

Once aloft, the pilot will tip the windmill 45 degrees forward to act in much the same capacity as does a double-bladed propeller. Stabilization will be achieved by means of small wings. When descending the propeller will be moved 20 degrees backward in the perpendicular, acting as a parachute as the power is decreased.

The helicopter has been studied by experts who believe that the machine is theoretically correct and should be able to rise and descend vertically.

French Glider Activity is Under Unified Control

Left, an interesting view of l'Avia primary training glider just before the take-off.

Below, the primary trainer in flight.

GLIDING in France is directed and encouraged by L'Avia and the various glider clubs which work in harmony with this organization to develop the sport. L'Avia makes possible the scientific and technical study of gliding and offers the results of its research to organizations and individuals interested.

The technical section constructs all types of recognized gliders and studies new plans. The scientific and technical division also approves gliders made by the clubs. All findings of these sections are published.

Through the efforts of the French Flying Club, L'Avia is permitted, since July 1, 1930, to issue "A," "B," and "C" glider licenses.

Membership fees in L'Avia range from approximately $2.50 to $20.00. Members receive the monthly publication.

Subscribing associations and clubs are entitled to receive glider plans at a cost ranging from 200 to 1,000 francs ($8 to $40) each, articles of interest and the monthly publication of L'Avia, instructions for forming and conducting clubs, help in obtaining materials for the construction of gliders, aid to technicians in picking out suitable sites for gliding fields or for inspection of gliders which have been constructed by the clubs, and the services of speakers on the different phases of gliding.

Dentist Gives High Flyers Tips On Oxygen Use

A DENTIST was reading recently how Miss Ruth Nichols, noted woman flier, almost froze her tongue while inhaling dangerously cold oxygen during the flight in which she set a new altitude record for women.

The dentist, Dr. Abraham Sternhart, Brooklyn, N. Y., immediately made a suggestion which should be a valuable tip to other fliers who like the high altitudes. He says:

"The oxygen cylinder, in whichever part of the plane it is hidden, should be connected to a valve in the forepart of the machine, which should be kept warm by an electric heater or hood. As the gas passes from the cylinder it will flow through the warm valve and be delivered to the pilot in a warm state and thus prevent not only the tongue freezing, but will also prevent the development of post-flight pneumonia.

"Dentists have long recognized this principle in administering gases to patients, and have made provision for its elimination by providing a heating device in their gas apparatus."

Clever Pilot Averts Disaster With Crippled Plane

PILOT CHARLES WEIBLIN of Pittsburgh Airways has learned how to get a raise in salary, but he doesn't recommend the scheme to his fellow fliers.

Weiblin took off from Pittsburgh a few weeks ago, with Buffalo as the next stop. He had three women passengers who were going to a convention in Buffalo.

A strut on the right side of the plane collapsed as he took off, and a wheel was dropped. Weiblin knew something was wrong, and another flier confirmed it when he took the air in a plane on the side of which had been hastily scrawled, "broken wheel."

Weiblin circled the field for an hour seeking an opportune place to land, finally "pancaking" and coming into the ground with a thud and a grind. The ship tipped on one wing, but did not turn over, and no one was hurt.

Weiblin was notified the next day that his salary had been raised $100 a week for his coolness and resourcefulness in bringing ship and passengers down with a minimum of damage.

New Plane is Self Stabilizing

G. WILBUR CORNELIUS, Burbank, California, transport pilot, recently flew a newly designed monoplane from Los Angeles to San Francisco and back without having to touch the ship's balancing controls, in a test run, part of which was through fog.

He said he negotiated the fog without aid of any blind flying instruments, keeping the ship on its course with the help of a compass. The only control work by the pilot was through the ship's rudder bar, to keep the nose pointed toward its goal.

The plane, an open cockpit, two-passenger, high wing affair, is different from others in that the wings are connected to the fuselage only with a single steel tube, allowing them to change their angles of air attack, according to the air forces encountered. This, Cornelius said, allows the pilot to ignore the control stick and use only the foot rudder, the plane banking automatically in turning.

"I set the automatic elevator at 8,500 feet as I left the airport, and relaxed," interviewers report Cornelius as saying. "The ship leveled off at that elevation and I kept my course with the rudder, the free wings smoothing out bumps automatically and the set stabilizer at the tail keeping the ship at the predetermined height.

"From Salinas to Oakland (about 75 miles), I never caught a glimpse of the ground, and on the return with a passenger, we flew through clouds a pilot ordinarily would have been forced to dive under or go over. It was the greatest sensation of my years as a pilot."

Cornelius claims the ship will not spin or stall, its wings changing the center of lift before flying speed is lost.

Department of Commerce Furnishes Maps

A SECTIONAL airway map showing nearly 50,000 square miles of territory in the vicinity of Lake Michigan, and indicating airways and aids to air navigation as well as topographical features within an area approximately 320 miles from east to west and 150 miles from north to south, has been prepared by the Aeronautics Branch of the Department of Commerce and is now ready for distribution.

The map is the second of a series of 92 sectional airway maps, covering the entire United States, planned by the Aeronautics Branch in connection with its airway mapping program. The sectional airway map just completed is known as Upper K-16, Milwaukee, and the one previously published is Lower K-16, Chicago.

Sectional airway maps sell for 40 cents each. They may be ordered from the Director of Coast and Geodetic Survey, Washington, D. C., and orders must be accompanied by remittances.

XUM

The Akron's Control Room

No waste space here. Every nook and corner is filled with instruments to insure safe dirigible flight.

by WALTER E. BURTON

WHEN you take a walk you need only two or three of your senses. When you drive a car, you supplement your sensory equipment with a dashboard full of other senses—instruments that tell how fast you are driving, how hot the engine is, and whether there is enough gas to get to the next station.

But when you go Zeppelining—or maybe it should be "Zepping"—you can put practically all of your nature-given senses away and rely wholly on an imposing array of man-made instruments.

The airship AKRON that is being built for the United States Navy is a good example. The ship has a nervous system and a group of sense organs as nearly complete as science has been able to create. This will enable it to cruise the skies like a true monster of the air, alert to everything that is going on which might affect its behavior.

Imagine yourself aboard the AKRON while it is tied up to a mooring mast during a storm. Anxiously the skipper is pacing back and forth, pausing frequently to study a pair of dials which lose themselves among the mass of instruments on the cabin walls.

If you could read the captain's mind, you would know that he is wondering how much longer the bow-force indicators—that's what the dials are—are going to continue their upward journey. If the hands come uncomfortably near the 25-ton mark, the captain will order the ship cast off, to ride out the gale.

A 110-ton airship, anchored by its nose to a steel mooring mast, swings in the wind like a vane. Even in moderate winds, the forces exerted on the bow and the moorings are considerable. Up or down air currents and an excess or deficiency of buoyancy cause vertical forces to act. These are measured by one of the bow-force indicators.

Wind acting on the sides of the craft is responsible for horizontal and athwartship forces. Another indicator takes care of these. These two sense organs of the airship act at all times to prevent possible damage to the craft . . . providing, as it were, a supersensitive nose that smells mechanical forces.

The storm subsides, the captain breathes easier, and you await impatiently for the delayed take-off. Then you find the officers consulting other instruments, particularly one that looks like a recording thermometer. You learn that it really is a thermometer, and that it works all the time, recording temperatures in three of the dozen gas cells and in the outside air.

If the lifting gas is 10 degrees Fahrenheit warmer than the air outside, the AKRON will lift four tons more weight than if the temperature were even. This, of course, enters into the determination of the load that the ship will carry, and the customary "weighing off" process before a flight.

Even after the ship has taken the air, the captain and other officers keep their eyes on the thermometers. Clouds, sunshine, warm air currents and cold regions cause the relative temperatures to vary widely, and make more difficult the task of maintaining equilibrium. So it is important that the airship's temperature sense function at all times.

MOVE to the forward end of the control room and you find the rudder man who steers the airship from right to left with a wheel, exactly as if he were sailing a surface vessel. He keeps one eye on a dead-beat compass equipped for obtaining bearings on the sun and on ground objects, and thus maintains his course. Nearby, on the port side, is the elevator man manipulating another wheel that regulates the climbing or diving angle of the airship and thus controls altitude.

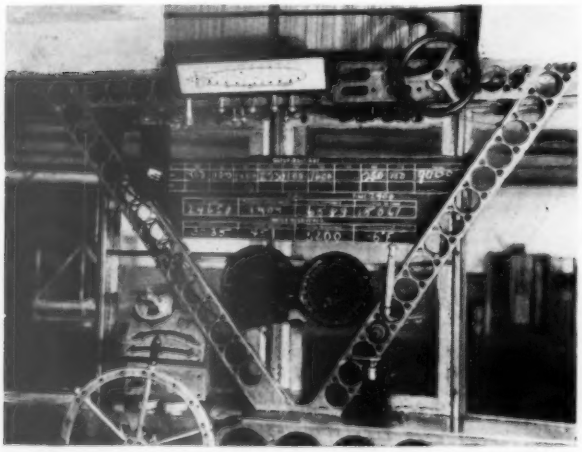
In almost every available square inch of space about these wheels there is some kind of instrument or control—a sensitive precision altimeter accurate to within 10 feet, a level flight indicator which, after being set, helps the elevator man keep the ship at a constant altitude; a variometer or rate-of-climb indicator showing, at a glance, the velocity with which the ship is climbing or descending, and so on.

For the particular benefit of the elevator man, there is a double inclinometer indicating the angle of the longitudinal axis of the ship in relation to the horizontal—how much it is tipped up or down, in other words. There are two bubble tubes in this instrument, one accurate to five degrees, and the other less sensitive, but reading up to 25 degrees.

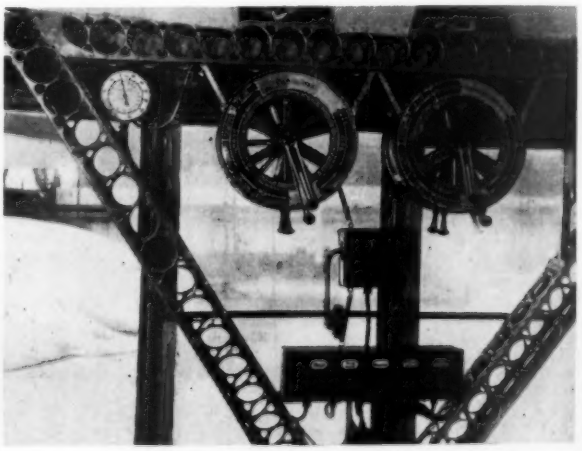
Not all the lifting in an airship is done by the gas. When the ship flies at an upward angle there is a certain amount of dynamic lift resulting from the hull's trying to imitate an airplane wing. This lift cannot be measured accurately, but it can be estimated closely enough for all practical needs if the air pressure at the top and bottom of the bow is known. Therefore, instruments are included for measuring these pressures, and for telling the skipper indirectly how much his engines are helping out his helium.

Of course the matter of speed is important, even if there are no aerial speed cops. The captain can learn how

The elevator control station. Here are altimeters, inclinometers, variometers, and ballast controls.



The engine room signals, telephone and air speed indicator for the Captain.



fast he is traveling through the air by glancing at his airspeed meter, just as he determines the altitude by consulting one of the aneroid-type barometers in the control room. The airspeed indicator is operated electrically by a wind impeller mounted on the outside of the hull, part way up one side.

Your study of these instruments may be interrupted by a bell ringing insistently. You think immediately of an alarm clock or a cash register or whatever a bell signifies to you. But the captain explains that it is just an alarm indicating that the helium-filled gas cells have swollen to the danger point. But in spite of his apparent unconcern, he immediately gives an order, and the hand of the altimeter moves back a little.

The AKRON, being a helium-filled airship, leaves the ground with its gas cells partly empty. The helium hugs the tops, and the lower portions are flabby. As the craft gains altitude, air pressure becomes less, and the helium expands.

The captain, before the start, would have calculated the maximum altitude that he would reach, and just enough helium to fill the cells fully at this height would be admitted. When the bell rings, it indicates that this "pressure height" has been exceeded, and that the ship must drop lower, or helium will have to be valved out. Helium costs more than rudder depreciation, so the altitude is lessened a bit. Of course, in time of war, altitude might mean much; then gas would be valved, perhaps more ballast dropped, and the AKRON would rise still higher.

TIRING of the control room, you wander to a little compartment just abaft—navy language for "to the rear of"—the control room, and find the ship's navigator busy at his desk. Just as the back-seat driver of a motor car usually keeps his or her eye on the speedometer, road map and road signs, so the navigator must watch a collection of instruments, consult charts, and be on the lookout for landmarks.

Above his desk is a group of dials including an airspeed indicator, an airspeed recorder, a simple altimeter, and an air log or mileage recorder; and beside his desk is mounted a small compass that saves him frequent trips to the rudder man's stand.

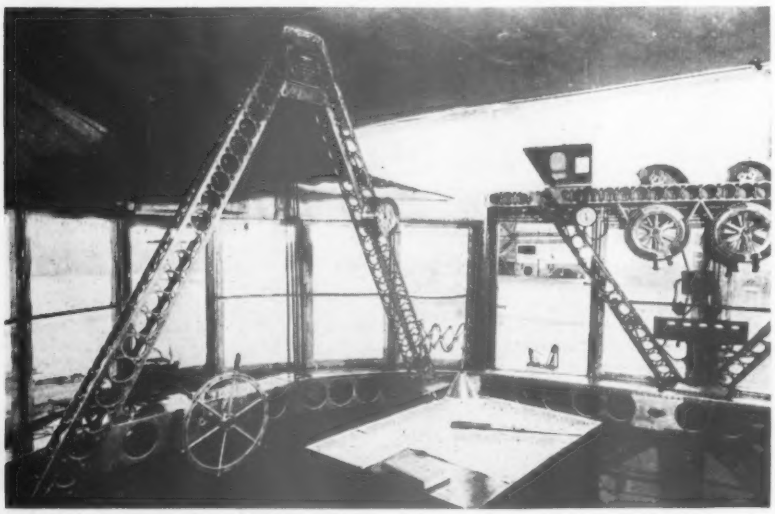
On the opposite side of the navigator's room is a compartment, specially ventilated, inclosing an aerograph. This instrument faithfully keeps a record of air humidity, temperature and barometric pressure. From this graphic record, the altitude record of the AKRON'S flight may be derived. Furthermore, the information may be valuable for later study in connection with weather conditions.

Another specialized sense organ you will find on the new airship is the drift indicator or sight, an instrument for measuring how much a ship is being blown off its course, and its speed in relation to the ground. It would be difficult to fly a Zeppelin safely without such a gadget, for it assists the navigator in determining the probable time of arrival at a given destination and in checking his course.

A second indicator of this sort is carried, one mount for it being installed near the rudder man, and another in the after room of the protruding structure. When used in this "after" position, the instrument enables bearings to be taken on objects astern, as well as giving the drift angle, ground speed, and the like.

By the time your journey is over, you will agree that the AKRON'S instruments are as complete as any ever installed on an airship. Could you learn to use them? You throw up your hands. Yet the officers and crew members must become as familiar with them as with their wrist watches. Small wonder that, to fly one of Uncle Sam's lighter-than-air scouts, a man must be a balloonist, engineer, scientist, and flyer rolled into one.

Without its various specialized senses the AKRON could not fly—very far, at least. By making use of the ship's nervous system, the captain or any of the other officers can in effect extend his own limited nerves and muscles to embrace the farthermost part of the craft. It's something like riding a horse: If you can make yourself virtually a part of your mount, you will "navigate" with much less difficulty for all concerned.



Interior of the control car showing the wheelsman's post at the bow and the captain's station to the right.

New Type Planes Strengthen Air Forces

"ACCOMPLISH your mission." That is the rule, the motto of the air force. The planes—light and heavy pursuit, bombing, attack—every type of plane has its own function to perform and upon each depends the value and success of all the others.

The pursuit plane is the aggressive plane which forces combat. Upon this plane, especially, does much depend. It must keep the enemy planes down—for the attack plane cannot function, the bombing plane and the observation plane is useless when enemy planes are aloft.

Because they must swoop like hawks upon their prey, the pursuit planes find their greatest strength in altitude. American pilots are conspicuous for their aerial acrobatics, and their ability to push the aerial battlefield to points as high as 30,000 feet. Army pursuit planes of the latest type have 600-horsepower engines, a speed of 200 miles, and carry 30-calibre machine guns. The pursuit plane also carries ten 25-pound bombs for use against ground formations.

The bombing planes are heavy and unmeneuverable. Of them it well might be said, "United we stand, divided we fall." For so long as the bombers stay in close formation, wing to wing, they are a flying fortress; but once the formation is broken, they fall easy prey to the swift, darting pursuit planes.

Tests are being made by the Air Corps with a two-place plane to take the place of the single-seater pursuit plane. In the biplace a gunner would be placed in a narrow space behind the pilot. A machine gun turning on a swivel would be mounted on the fuselage, and in this way the pursuit plane would be protected from the rear, which up to now has been exposed to attack.

The latest type of bombardment plane has two 600-horsepower engines and a speed of 130 miles an hour. The sides and floor are of glass. From 2,200 pounds to 4,000 pounds of bombs can be taken up. A bomber carries five men, the pilot, co-pilot-navigator, bombardier, radio operator and machine gunner. The projectiles, weighing from 200 to 1,000 pounds each, are carried on a bomb-rack in a square,

(*Continued on page* 60)

Autogiros to Link Air-Rail Travel

A PLAN is in contemplation in Great Britain to link up railway and air travel by means of autogiros which take off and land in small spaces or on roof tops. The plan includes the building of roof-top landing stages at London railway stations and in the provinces, autogiro taxis to convey passengers direct from the stations to any part of the country or the Continent, concealed hangars from which autogiros will be raised by elevators into a position for taking off from station roofs and comfortable roof-top refreshment rooms for travelers.

It is already suggested that a roof-top airdrome be built above Waterloo station and a number of other airdrome sites in the heart of London have also been discussed. The small space needed by autogiros has aroused the interest of railway circles in the project.

Airplanes Are Tasty Cow Fodder

BELIEVE it or not, cows eat airplanes. Here is the visual, indisputable proof. You may have your doubts about the bovines so leisurely inspecting the wreckage, but probably they are only looking for a tasty morsel.

Note the old bossy getting down to business on the rudder. Does she like dope? You bet your life. There's nothing equal to a little banana oil for aiding a cow's digestion.

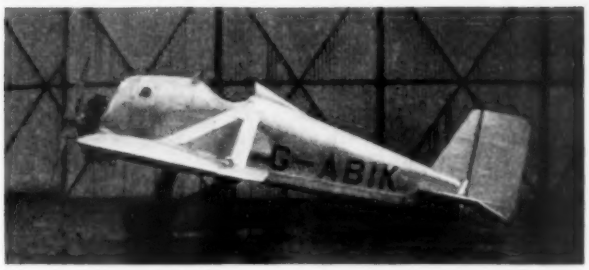
This picture was taken after a Moth plane owned by the British Air Transport of Croydon Airdrome crashed during a storm at Titsey Hill near Tatsfield, Surrey, England.

Silent Propeller Invented

CHRISTIAN A. VOLF, Danish-born acoustical engineer, now of New York City, has invented a new type of airplane propeller. He got his idea from a design for a siren. This new propeller, which the inventor thinks will result in revolutionary changes in air-craft, is called the spinner or rotor propeller.

The inventor would equip his craft with eight of these spinners (in pairs). Not only is his spinner silent, but he says preliminary tests indicate an efficiency surpassing that of standard propellers.

English Lightplane Has Many Novel Features



The Angus Aquila was designed for mass production. Its design incorporates many unique ideas which simplify the construction and reduce the cost of the plane.

ONE of the most unique and original light planes is the Angus Aquila built by Mr. A. L. Angus in England. It is a single-seat low wing monoplane and was designed for mass production in an effort to reduce the cost of light plane ownership.

The wings of the Aquila are of standard wood and fabric construction and fold back along the all metal fuselage. The wings are attached to a center section structure which also supports the motor, cockpit equipment, controls and landing gear.

Built into this center section is a large box spar which forms the backbone of the plane and runs along the bottom of the fuselage to the tail. The metal fuselage, carrying no stresses, serves merely as a streamlining factor. The plane has a span of 24 feet, a length of 15 feet 9 inches and weighs 600 lbs.

Powered with a 40 h. p. Salmson engine, the Aquila has a top speed of 107 m.p.h. and a landing speed of 45 m.p.h. Gasoline consumption of 28 miles per gallon is reported. The first experimental plane was produced at a cost of $800 without the motor.

Airport to Have Safe and Sane Dedication

THE Board of Airport Commissioners of the City of New Haven, Connecticut, announces its intention to dedicate the New Haven Municipal Airport on Saturday, August 29, 1931.

It is the desire of the Commissioners that this dedication be of a modest and sane nature, conducted along such lines that the public will be impressed with the utility and safety of aviation rather than frightened away by an exhibit of all its dangers and possibly serious accident.

With this policy in mind, it is intended to invite manufacturers and dealers to exhibit their ships in an open-air exhibit. A space will be set aside and roped off so that the public can see these ships closely and yet be under control.

It is also intended to permit passenger hopping by commercial companies and operators, who have applied in advance, and submitted their ships for inspection and their pilots' records for qualification. Also proper liability insurance will be required on all ships engaging in this activity.

It is intended to have a few contests and give cash prizes for balloon bursting, spot landings, dead stick landings, and bomb dropping. It is also intended to have some formation flying and possibly some expert parachute jumping.

The passenger hopping will not be permitted while the other activities are taking place but will probably start about the middle of the afternoon and continue into the evening when the field will be lighted to give a demonstration of all of its facilities.

Airspeed Meter for Gliders

GLEN ELLIOTT, shown here at the controls of a Franklin utility glider, is ready to flight test a sensitive airspeed indicator and ball type fore and aft inclinometer.

This compact unit was designed and constructed by a member of the Washington and Standards Gliding Clubs, Washington, D. C. It is a help for students sitting in the nose of the glider to know their fore and aft inclination, and to realize their actual flying speeds.

The unit consists of a double-venturi tube (one venturi tube inside another) connected to an airspeed indicator, the mechanism thus giving large deflections of the pointer for low airspeeds. The inclinometer is the common ball type instrument, a steel ball rolling in a curved glass tube with the motion of the ball damped by a liquid.

The sensitive airspeed meter and inclinometer are attached to the wing struts.

Jimmy Doolittle Makes Thrilling Leap From Crippled Ship

MAJOR JAMES H. (JIMMY) DOOLITTLE, formerly an ace stunter of the army air corps, leaped to safety a few weeks ago when the fabric tore loose from the wings of his plane while traveling at an indicated speed of 235 miles an hour. Although Doolittle was not injured, the plane was a total washout. His leap is considered one of the most spectacular in aviation history.

Doolittle was putting the plane, one of his own design with which he had hoped to break the present record for land planes, through speed tests at East St. Louis. He was flying at an altitude of only about 100 feet when

Doolittle's plane in process of construction.

the wings started to flutter and then pieces of fabric began to fall. The flyer immediately nosed the plane upward and leaped when it reached an altitude of between 300 and 400 feet. Doolittle said the wings, which he had taken from an old plane, apparently were not strong enough for the high speed he was making.

"Jimmy" Doolittle had bailed out before, but he regarded this leap as his closest call, due to his speed and low altitude. He had been flying the plane for about 15 minutes before the trouble developed. When the fabric started falling from the wings, one witness said, it looked as though the plane had struck "a bunch of birds."

Doolittle's plane was completed only

In flight. Doolittle had hoped to break the world's speed record for land planes.

a short while before his flight. This flight was the first of a series Doolittle had planned with an ultimate view of attempting to break both the American and world speed records for land planes. The American record is 266 miles an hour and the world record 277.

"I was in level at about 235 miles an hour," Doolittle said, "when I suddenly felt the right wing become heavy. I couldn't tell what had happened, but I knew I would have to nose her up if I was going to get out. I pulled the ship up as steep as I could and turned her over on her back. Then I let loose. I was so close to the ground it seemed I didn't have time to do more than pull the rip cord before I landed."

When the first spectators reached the scene Doolittle was intently searching for the rip cord, which aviators who bail out consider a good-luck souvenir. He found it. Doolittle's 10-year old son, Jimmy, Junior, was in the crowd which witnessed the famous flyer's narrow escape.

Finis. What was left of the plane was quickly taken by souvenir hunters.

Balloons To Indicate Fog-Bound Airports

CAPTIVE balloons, lighted to indicate position and altitude as markers for fog-bound airports, have been suggested by California pilots as a possible key to the problem of landing aircraft that are helpless when earth and landing fields are blanketed by fog.

The suggestion has a few minor unfavorable points, such as the wire connecting the balloon with its ground station representing an obstacle for pilots, but, in the opinion of some flyers, promises advantages which would balance the sheet in its favor.

In California the fog layer rarely extends to an altitude of more than 2,500 feet. The flyer finds it impossible to get under the ceiling, so he rises above the layer that obscures his vision from the ground. He knows that there are airports below, but to dive down through that blanket without an idea as to the exact location of a skyport obviously would be disastrous. Such a situation could be solved by balloons, pilots believe. This is the way it would work:

Three balloons, twenty-five feet in diameter, anchored to trucks on an airport, can be sent up through the fog and out on top. A newly-developed fog-sensitive instrument will indicate when the balloons are above the fog. On each balloon will be electrical neon numbers indicating the altitude at which the balloons are stopped—not more than two numerals being required up to 10,000 feet. The figure 16, for instance, indicates that the gas bag is at 1,600 feet. Anchoring cables will be equipped with warning lights at 50-foot intervals.

The three balloons will form a triangle—the narrow base of which will indicate the end of the port that the flyer should approach for landing, and the two sides of the landing lane, while the third will mark the other end of the port. The latter will be in the center of the proper lane.

An experienced pilot, informed where his landing lane rests and of his altitude, is able to line his ship up at the proper angle to glide down to landing—flying "blind" by his navigation instruments. Nine times out of ten the ceiling—the distance between the ground and the bottom layer of fog—will be at least fifty feet, so that a pilot will be able to come out on the under side with enough visibility to set down.

Glider Planes Proposed for Freight Carrying

RECENT spectacular flights by engineless aircraft, particularly the crossings of the English Channel, have raised again the fascinating idea of "glider trains," consisting of a power-driven craft having in tow a number of gliders which might be detached above their respective destinations like slip coaches from a railway train.

Gliding experts declare that the load which can be transported for a given engine power by a glider train is 60 per cent greater than a single power-driven plane could carry, while the towing aeroplane becomes virtually a flying fuel tank of much greater range than it could possibly have if it carried pay load as well. A further advantage claimed for the scheme is that gliders do not require special landing grounds.

European Airports Are Community Social Centers

CAPT. Frank M. Hawks, who recently startled Europe with some speed flying, brought back from Europe several definite ideas, among them one concerning airports.

"In Europe, the airport is a social center," declared Capt. Hawks. "Every large European airport has fieldhouses, restaurants, cafes and beer-gardens. People with only small interest in actual flying use the fields for recreation and sport. They are open to the public, instead of being small and exclusive, and an interest in flying naturally is developed among the masses. America might take a lesson there."

But while Capt. Hawks admires this feature, he declares that American landing fields, with their paved runways, are far better than those of Europe.

A New Lightplane Record

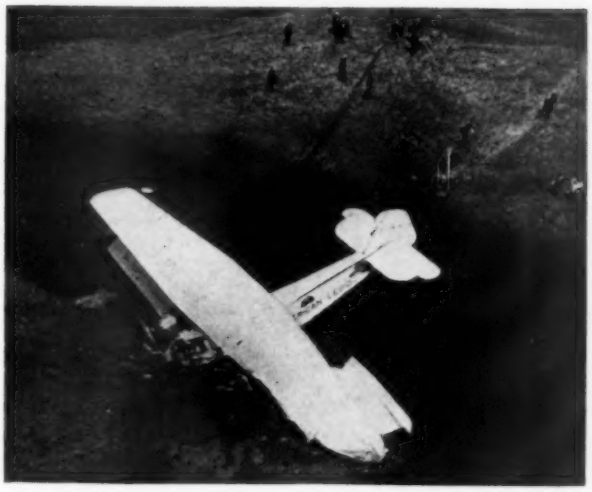
MRS. MAY HAIZLIP, St. Louis aviatrix, recently reached an altitude of approximately 22,000 feet in a Buhl "Bull Pup" single-seater plane. The altitude will be checked by the N. A. A. and will probably become the basis of a women's record for the type plane used.

Take-off Crackups

One of the greatest dangers in long distance or record flying occurs before the plane leaves the ground. Will it rise or not? The record of some famous planes that failed to take off furnishes the basis of this informative article

by

W. L. OLIVER



The wreck of the American Legion, one of the first entries in the 1927 trans-Atlantic race. It rose a few feet only to crash with disastrous results.

THE launching of heavily laden planes, trying for distance or duration records, can not be classed with normal, every-day flying. Rather is this a form of stunt flying. In each case the plane's reaction to the motor's efforts and the pilot's skill is an unknown which must remain an unknown until the craft rises safely, refuses to rise or soars briefly only to drop back to earth again.

Airplane designers have in mind both power loading and wing loading—and a thousand other complicated factors—when they are drawing up blue prints of the craft they have envisaged. Power loading is approximately the weight of the plane divided by the horsepower. In other words, a plane weighing 1,700 pounds powered by a 90 horsepower motor has a power loading of nearly 19 pounds per horsepower.

Wing loading is approximately the weight of the plane divided by the area of the wings. A plane weighing 1,800 pounds and having a wing area of 240 feet will have a wing loading of about 7.5 pounds per square foot. There are dozens of factors which may affeet these final totals, however.

Then the designer has to remember that gasoline weighs about 6½ pounds per gallon—more or less depending on grade—with oil considerably heavier. Having figured his wing loading, power loading, and fuel consumption, he can begin to estimate his speed and cruising radius.

Then there is the problem of weight of power plant. In the early experimental plane models, steam power plants were used, developing approximately one horsepower to 2 pounds of weight. These were not satisfactory and when the Wrights came along and made their historic flight at Kitty Hawk, N. C., in 1903, engineers found that a home-made gasoline engine had been used.

These gas engines, at first unreliable, gradually have been refined in operation, decreased in weight and given almost unbelievable limits of stamina and endurance. In the war days and since the real old reliable was the OX-5. This engine weighed about 4 1/5 pounds per horsepower, dry, meaning without gas, oil or water.

This is too heavy for modern speeds and performance, so literally hundreds of engineers have busied themselves, particularly in the last five years, in developing lighter and more efficient power plants. Among the most interesting of these are the Wright "Whirlwind" series of air-cooled motors and the Pratt and Whitney line, also air-cooled. The latter concern turns out the famous "Wasp," which develops one horsepower for each 1.67 pounds of weight. It is said lighter motors are already being assembled by other companies, one weighing just a small fraction over a pound a horsepower.

The above figures may aid in a better appreciation of some of the following incidents of crashes or near crashes due to overload at the takeoff. And by overload is meant a weight far in excess of the normal for that type of plane.

SEVERAL years ago Raymond Orteig offered a prize of $25,000 for the first flier to travel by airplane from New York to Paris. This was a large order for planes of seven years ago but not too large to stir the ambitions of every pilot from the rock-ribbed coasts of Maine to the sunny climes of California or from the far outposts of Oregon to Florida's more or less coral strand.

The aviator generally averse to talking about himself, nevertheless has his share of natural vanity and this reveals itself in his unspoken creed, "For God, For Country—and For Lots of Great Big Headlines."

Rene Fonck, France's flying falcon, was among the first to make a serious effort at a non-stop flight from New York to Paris. He interested capital to the extent of having Igor Sikorsky, Russian war-time airplane designer, build a huge tri-motored sesquiplane.

Roosevelt Field, near New York, was chosen for the start.

The big Sikorsky performed well in its tests and preparations were made for leaving the mile-long runway. Roosevelt Field, pilots say, is unequalled by any airport east of the Alleghanies for the launching of heavily-loaded heavier-than-air craft. "The plateau," as it was called in the old war days, has a fame which is international. Even when pioneer fliers, taking their cue from Orville and Wilbur Wright, were making their first flights, Roosevelt Field had its share of thrilling episodes.

Fonck obtained from Uncle Sam the loan of Lieut. Lawrence W. Curtin as navigator for the flight, while two experienced airplane mechanics were to form the crew. The plane was loaded with gasoline and oil sufficient for the estimated flying time to Paris and Captain Fonck attempted to take off.

The French ace took his plane practically the entire length of the field, but the load was too great to allow his craft to rise and too late he saw that he would be unable to clear a deep gully which stretched across the foot of the runway. The Sikorsky crashed against the far side of this, the huge gas tanks burst, sending fuel streaming over the heated engines and the wreckage quickly was in flames.

Fonck and Curtin, obeying the instinct of self-preservation, climbed out, dazed, and when they realized their two mechanics were caught in the fire it was too late to effect their rescue. Thus the first serious attempt at the Paris flight went up in smoke, a failure.

A TAKE-OFF crash the following year, under somewhat similar circumstances and which wrung the hearts of men of the navy, resulted in the deaths of Lieut.-Comdr. Noel Davis and Lieut. Stanton Wooster. The two died at Langley Field in the wreckage of the Keystone-built "American Legion."

Davis and Wooster also were plan-

ning to dare the broad Atlantic. They managed to get off the ground, and thereby hangs the story of "ground air cushion" and "horizontal equivalent." The former is what the name indicates, the latter is the area of lift in an imaginary horizontal plane. Obviously, if a plane is tilted, the lifting surface is reduced, bringing "loss of lift," another good aviation term.

The big Keystone was, in a sense, built to Commander Davis' order. But it was reported to have been more than 1,100 pounds heavier than Davis had expected and newspaper accounts soon after the disaster said that the commander had been greatly disappointed when this was discovered. The craft was powered with three air-cooled motors, with a total horsepower of about 700.

After the load tests had started it was found that the ship was performing satisfactorily and the loads were gradually increased. The plane itself weighed 8,000 pounds and it was planned to take off on the big flight with over 1,300 gallons of gasoline, the total fuel load, including oil, being about 9,000 pounds.

Clarence D. Chamberlain and Roger Q. Williams look over the remains of their Bellanca which failed to lift the heavy load of gas.

The day of the final load test the "American Legion" was wheeled out on the runway at Langley Field and headed into the wind, which that day was coming from the direction of the dirigible hangars, about a mile from the airplane buildings. The giant tanks were filled, the craft's tires sinking a bit under the 17,000-pound load.

Each of the 9-cylinder motors was tested, separately and in unison, and Lieut. Wooster, one of the finest pilots of multi-motored planes the navy could boast, waved the wheel chocks aside. He gunned his three motors all the way out and the wheels slowly began to move. The big plane gradually gained speed and when more than three fourths of the way down toward the dirigible hangars, it began to rise. Lieut. Wooster held it close to the ground, gaining precious air speed, then tried to climb.

Experiments indicate that the ground air cushion is variable in depth, extending upward approximately the span of any given plane or wing. This air cushion is in effect less yielding than air when the plane is at a higher level. Less yielding, it follows that it offers more support. This paragraph began with the words "experiments indicate." And that is just about as much as is known about ground air cushion.

If you will take a sheet of paper and drop it with the plane surface parallel with a table top, you can see the effect of the air cushion for yourself, for when the paper is a barely perceptible distance from the table top it will stop falling and skid forward several inches. Fliers know that the air cushion is there, and they accept it without question and are thankful.

The "American Legion," with its wing span of about 80 feet, reached the top of this air cushion and was unable to rise higher. The dirigible hangar was too close to the line of flight for comfort and the inevitable trees were just to one side. Lieut. Wooster could climb no higher, so he had to try to dodge. When he did that he had to drop one wing to bank and turn. He lost his precious lift due to the reduced "horizontal equivalent" of the wings, and the 8½-ton craft began to sink.

Here his skill acquired in years of flying heavy transports, bombers and flying-boats began to serve him. Lieut. Wooster was striving now for a landing on the only available spot, a sunken stretch of ground adjoining the flying field.

The pilot was straightening the ship out as he neared the ground and almost had it leveled out when one wheel touched, then the other, and the overloaded craft began to skid, then sink in a hollow made marshy by recent rains. As the wheels dug in, the nose dropped and the plane nosed over. The two fliers, in the forward cockpit, were caught as gasoline leaked out and filled their almost airtight quarters with fumes. They were suffocated when rescuers came up.

IN 1928 A. R. Martine, New York broker and aviation enthusiast, decided to try for a new endurance record. He had Guiseppe Bellanca, Italian genius, design his ship and arranged with Clarence D. Chamberlin, transoceanic flier, and Roger Q. Williams, also an ocean hopper, to fly it. Richmond, Va., was selected for the trial.

The Bellanca ship, a monoplane, was built. It wore the famous Bellanca "tin pants" which streamline the wheels and was pulled through the air by a Wright Whirlwind motor of a little over 200 horsepower. The north and south runway of the municipal airport at Fort Lee, near Richmond, was selected, the east and west runway being too short. The chosen runway at that time was a little over 2,000 feet long, bordered at right angles on the south end by a line of high tension wires carrying power to the government beacon at the airport and the field landing lights. From the start, therefore, a takeoff to the south was out of the question.

The time of the year, late in the winter, was not propitious from a weather standpoint; rains, snow, freezes and subsequent thaws having done considerable damage to the runway. At the north end the runway terminated at the edge of the old war-time government plant near Sandston, a territory covered with trees, abandoned foundations and slightly elevated spur track gradings. The takeoff, however, had to be toward the north.

The monoplane demonstrated the customary Bellanca-built ability to get off the ground with a heavy load during the early stages of the preliminary tests. When these were completed it was deemed advisable to build a short wooden runway at the south end of the soil route to help give the craft an initial impetus before it reached the soft ground.

The night before the big attempt, heavy power rollers were sent over a part of the course, but the ground was so soft that these had difficulty maneuvering. On the night before the morning of the test there was a slight freeze, but not sufficient to harden the ground to a depth of more than one or two inches.

Chamberlin and Williams climbed into the cockpit, probably feeling as Lindbergh did at the start of the flight to Paris, that they were entering a death chamber. Williams had orders to dump the gasoline through a large, especially-constructed dump valve the moment Chamberlin gave the signal. Chamberlin was to make this sign if the craft reached a marked and flagged point on the runway without leaving the ground.

The ship quickly gained headway on

(*Continued on page* 61)

Laboratory Plane to Test Wing Pressures

WING pressure will be studied by the British air ministry, who have had two monoplanes designed and constructed so that the aerodynamic forces operating on the wings can be measured in flight.

The main feature of the design is that the wing bracing struts, certain wing members and a main fuselage member constitute between them a parallelogram which may be considered as a kind of swinging cradle, allowing relative movement between the wings and the fuselage under the influence of the air forces on the wings. This relative movement, however, is prevented by a member connecting the rear spars of the wings with the lever of a dynamometer situated centrally in the fuselage and slightly forward of the leading edge of the wings.

The load thus communicated to the dynamometer is due partly to the lift and partly to the drag of the wings. The load is indicated directly on the recording dial of the dynamometer. Two readings are needed to obtain the figures necessary.

In addition to the usual flying controls the pilot's cabin contains a lever actuating a hydraulic brake on the propeller, thus enabling the wing-load test readings to be obtained without interference from the slipstream thrown back by the propeller. After gliding with the propeller stopped, the engine may be restarted by means of a gasoline starter operated from the pilot's seat.

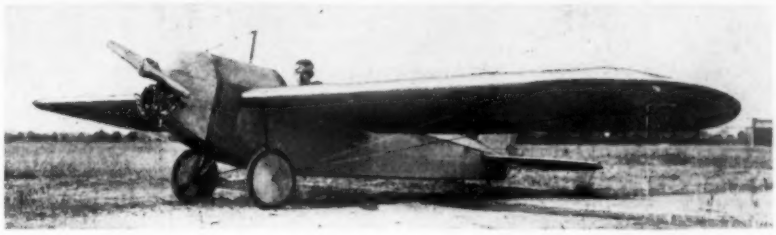
These research aircraft are of moderate size, each measuring about 42 feet from wing-tip to wing-tip. They are equipped with a super-charged "Lynx" air-cooled 226 horsepower engine and fly at a maximum speed of 119 miles an hour at a height of 8,000 feet; they are said to climb to an absolute ceiling of 29,000 feet.

A Radical Experiment

INVENTORS of this plane, demonstrated at Berlin, Germany, call it the "Turkey-Cock," and a glance at the photograph serves to prove how aptly it is named. The two flaps or odd-looking wings at the top of the ship are said to enable it to rise from the ground at an angle of sixty degrees, after a very short take-off run.

The "Turkey-Cook," shown here after a trial flight, is equipped with a nine cylinder Siemens-Halske motor.

Tiny German Plane Sells Complete for $225



GERMANY offers a new sport plane that should go far to popularize flying among those who cannot afford expensive machines. It can be furnished complete for $225.

The 14 h.p. motor costs $130 and is the most expensive part of the plane. This model has a wing spread of 28.4 feet, an overall length of 18 feet and weighs 264 pounds empty. The new plane has been successfully tested and attained a speed of over 60 m.p.h.

A Lightplane Record

WHEN Mr. Charles Scott landed in a gale at Lympne aerodrome (England) the most notable lightplane exploit in the history of aviation was gloriously completed. Within the space of a few weeks this young man smashed Air Commodore Kingsford Smith's record for the flight from England to Australia and, still flying alone, he eclipsed by an even greater margin the previous fastest journey from Australia to England.

His story of the return flight is an epic of endurance and determination, leaving no room for doubt in the abilities of the modern lightplane to fly in the severest weather and to carry its pilot safely through the risks attendant on record-breaking flying anywhere in the world.

Scott tells of the solid walls of rain he flew through in the monsoon, of powerful head winds, and of clouds in the mountains. He left Australia without a sun helmet and was forced to alight early each day while flying in India because of fear of sunstroke —a loss of time that makes his achievement still more noteworthy.

Piloting a de Havilland "Gypsy Moth" single-seater biplane, Mr. Scott left Wyndham with the idea of making the flight back by easy stages. However, the chance to set up new figures in place of the 12 days 14 hours taken by Kingsford Smith and three companions in the big monoplane "Southern Cross" during July, 1929, was not to be declined, and before he had battled through to Rangoon, which he reached on the fifth day out, Scott was determined to break the record.

From then on, except for the short days in India, he piled in as many hours as possible in the air each day, and finished the journey with a nonstop hop of 1,350 miles from Brindisi, in Italy, to Lympne.

His elapsed time for the run of

(*Continued on page* 55)

Electric Ice Eliminator Successful in Tests

A PRACTICAL method of electrically heating the wings and other surfaces of an airplane, known as the Thompson wing ice eliminator, has been tested and patented and will shortly be manufactured on a quantity basis by the Iceless Air Wing Corporation.

This device consists of a heat-resisting light metal base, curved to fit the contour of the wing's leading edge, to which it is attached.

A layer of ⅛" pressed asbestos sheeting rests upon this base. Coils of 21-gauge nichrome wire run from end to end of each heating section of the device, the wire tapering from a series of center coils to a single wire at the wing-tips.

An easily-heated front or surface plate of special aluminum alloy is then attached, completing the unit.

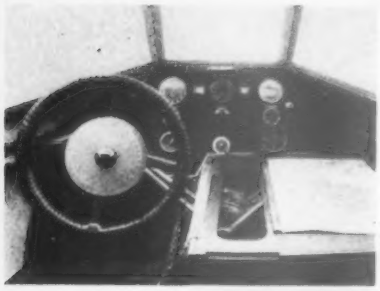
The chamber formed between the outer covering and the asbestos insulation constitutes a dead air space and not only conserves the warmth supplied in the chamber by the heated wires, but consequently requires only a comparatively small amount of current to maintain an above-freezing temperature on the plane's surfaces.

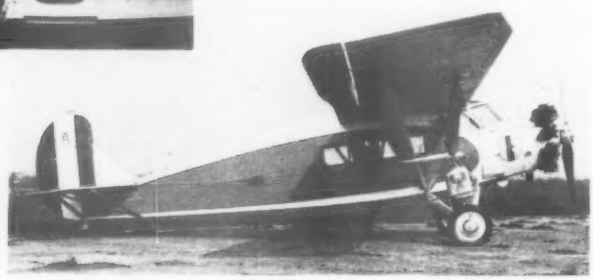
The entire heating element group is divided into several sections so that if for any reason one section fails to function, the others would perform independently. Each section of the heating element contains 180 feet of wire, and the apparatus may be heated to its maximum efficiency in less than two minutes while in flight amid ice conditions.

Similar installations are also attached to the leading edges of fin, stabilizer, struts and wheel pants, it being possible to use one or more heating sections each in the wings, fin, stabilizer, struts or pants, as needed. The asbestos firewall used in all but the wing sections is reduced to 1/16" in thickness.

Current to operate the heating elements is provided by a 1 k.w. air-driven generator mounted under the wing in the slipstream. Automatic thermostatic control at the pilot's finger-tips governs the amount of heat generated, as well as the number and location of heating units in operation at any given time.

Foolproof Device Coordinates Plane's Controls





Above is shown the wheel which controls all the plane's movements. There are no foot controls. Right, the 5-place Caproni, in which the trials of the device were made.

FROM POPULAR AVIATION'S Italian correspondent comes this account of an unusual and highly interesting development that is creating considerable comment in Italian aviation circles.

Commander Mario De Bernardi, well known Italian flyer, states that piloting is now within reach of anybody.

In fact, he has recently carried out successful trials of a new plane designed by him, which, although identically similar to all other planes, can be piloted as simply, easily and surely, as any automobile.

It is a "Caproni 97" five-seat, single motor monoplone. The pilot's seat has a wheel in front of it; this wheel connects—and here we have the new feature—all the controls of the plane. The foot lever has disappeared; all controls are concentrated, as in modern cars, and, like in the latter, a pedal for brake action on the wheels is placed below.

Commander De Bernardi observed that in flight the movements of the vertical rudder and those of the ailerons are connected by constant laws, and that certain positions of the ailerons always correspond to certain positions of the rudder. Should this harmony be interrupted for some reason, the plane assumes irregular positions which, unless rectified in time, may become very dangerous.

In place of the normal stick and rudder control, Commander De Bernardi has connected the rudder and aileron, so that their simultaneous working should no longer depend on the pilot's ability, but on a rigid system securing harmonic working, without any possibility of mistake.

A fixed, graduated quadrant bearing a hand connected to the wheel, is placed below the latter. This quadrant shows the control positions at all times. Elevator control is by the forward and backward movement of the wheel.

Once the plane is set on flying line, after setting the adjustable stabilizer, the pilot has nothing more to do, and he may, if he likes, turn his seat round so as to converse with his flight companions. Even when shaken by sudden gusts of wind or troublesome bumps, the plane always resumes, automatically and quietly, its equilibrium and the desired direction.

Pilots Are Responsible for Parachute Jumpers,

A WARNING to all licensed pilots that they are charged with the responsibility of taking every reasonable safety precaution in connection with exhibition parachute jumps from airplanes which they fly, was recently issued by Gilbert G. Budwig, Director of Air Regulation of the Department of Commerce.

"We must warn the pilots," said Mr. Budwig, "that the Department is holding them responsible for all reasonable safety precautions in connection with such exhibition jumps. The precautions to be taken should include:

"The pilot must ascertain to the best of his ability, the prior experience, training and instruction of the person planning the jump;

"If the pilot has reason to doubt the ability of the individual to make a safe descent, he must refuse to take him aloft;

"Upon satisfying himself that the individual is qualified for the undertaking, the pilot must see that he is equipped with two parachutes, both of which must bear the approval of the Department of Commerce.

"Furthermore, the pilots should bear in mind that exhibition parachute jumping comes within the category of acrobatic flying and therefore it is prohibited over a congested area of any city, town or settlement; over any open-air assembly of persons, over any established civil airway; over any established airport or landing field or within 1,000 feet horizontally thereof; and the jump must be made and the parachute must open at a height above 1,500 feet."

Curtiss-Wright Pilot Makes Bum Decision

A TRANSPORT pilot, faced with the necessity of landing from 1,500 feet due to motor failure, chose to land his plane on a roof of a farmhouse near Glenview, Ill., rather than light in any of the open fields which stretched for miles in all directions.

Charles Lehr, instructor at Curtiss-Reynolds Airport was the pilot who made this peculiar decision and although he and his passenger were unhurt, the plane was completely demolished and the farm house badly damaged.

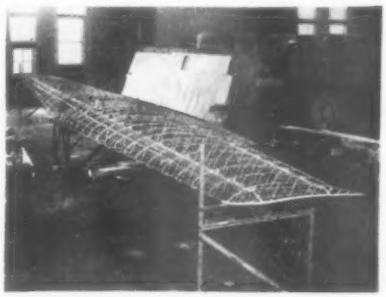
A New All Metal Wing

A MONOPLANE with wing construction entirely of Allegheny metal, the new chromium-nickel alloy, is undergoing test flights at Roosevelt Field, This plane, said to be first to use a wing built entirely of the new alloy, was built by Fleetwings, Inc.

The primary advantage of the new alloy for this purpose is the fact that it is not subject to atmospheric corrosion. Thus a new degree of safety is introduced into aeroplane construction.

Besides being non-corroding, the new alloy is believed to have several very definite advantages as compared with other materials for wing construction. One of these is its very high tensile strength.

As compared with chrome steel, which has been used for some spars, the alloy, being non-corrosive, requires no coating of any kind. Steel in similar applications would have to be sand-



The completed metal wing structure.

blasted after fabrication and then coated with red oxide. Sand blasting is difficult in the case of these complicated structural members, and with the oxide dipping, requires two additional operations.

The ribs used passed, with a large margin to spare, a severe test prescribed by the Department of Commerce. In this test rib was loaded to half its design load and the spar points were vibrated at the rate of 1150 vibrations per minute at 1/32 in. amplitude, for fifty hours, after which the ribs were subjected to a static load test with the full design load. The Department of Commerce requirement was for only 10 hours of such vibration.

XUM

Look Out, Lindbergh—Here I Come

I choose flying as a career and bump into some funny things

by

EDDIE SCHNEIDER

As told to MARY BELL DANN

I RECENTLY flew more than twelve thousand miles in a little over a month, through rain, fog, wind and snow, over mountains, cities and deserts, in a three-year-old, second-hand airplane that had already traveled some five hundred thousand miles. During that time I never was very late for an appointment or put a single scratch on myself. And considering that I am hardly an expert pilot at nineteen years of age, I knew that these statements must prove something about modern commercial aviation. But what?

Being pretty close to the picture, it is hard for me to see, but it does seem that it would show that aviation is for young people as well as the older and wiser generation. In fact, in New Jersey, a boy can get his pilot's license two years before he can get his driver's license.

So this is aimed at the youngsters, hoping they won't take it too seriously, and those who have arrived at years of discretion, first as pure amusement because some darned funny and interesting things can happen in aviation and second, there is a concealed missionary purpose, to show that aviation has arrived as an industry.

Not that it has much bearing on the story, but because people are always asking me, my name is really Eddie: I was christened that way. It isn't very dressy, but it serves the purpose. As for background, my grandfather was some kind of Scandinavian royalty and was thrown out of it for marrying a peasant girl. Dad has a butcher shop in Jersey City.

A recent photograph of Eddie Schneider with his Cessna. Eddie's winning smile has won him many friends among flyers.

The first time I was in the air was in Germany, from Hamburg to Hanover. My sister Alice was kind of nervous and decided she didn't want to make the flight after all and started to open the door to get out, not knowing that we had taken off and were in level flight. She changed her mind, you bet, and because there was so little motion she got to like it. Dad said, when he stepped out at the airdrome, that he wished he could always travel that way. We had had to coax him hard to get him to fly in the first place.

Right then I did some planning. I wanted to learn to fly a ship more than anything I had ever wanted to do in my life, but several months went by, and in the meantime I went back to work in the bank, before I was able to do anything definite about taking up what I hoped would be my life work.

The idea stuck and one Sunday night I went out to Roosevelt Field to find out all I could about it. We have Sunday dinner late in our house and it is a good two and a half hour trip by tube and train, although you can make it in a few minutes by air. It was dark when I got there and they were just about to close up for the night when I arrived.

I guess they thought I was having a brainstorm by the way I came madly dashing up and asked rapid questions. They didn't take me quite seriously as a prospective student and just merely tolerated me. I fooled them. Two days later I was back again and ready to fly.

Bill Ulbrich took me up over the cemetery in Westbury and pointed down, saying, "See that place? Well, you will be there if you touch the controls," and had a piece of iron pipe in his hand to enforce what he said. I don't blame him for not wanting me to monkey with the controls before I knew what it was all about, but the remark seems funny in this day of teaching you to fly by applied psychology.

Then he gave me the works, loops, barrel-rolls, in fact at that time I had no idea what I was getting. At the end of twenty minutes of stunting he told me to take the controls and keep the nose of the ship going straight and on the horizon in level flight. I did my best, but it was hard because I was dizzy from all the unaccustomed motions. I liked and didn't like it, but was back the next day for more. I didn't want to drag out my period of instruction, but to go through in a hurry.

Aviation was beginning to skyrocket. Everyone was interested and there was lots of activity on the field, but not much system, and there was still a good deal of war surplus junk around. One piece they hadn't gotten rid of yet was an old Tommy Morse scout plane.

One day a pilot who hadn't flown in about a year took it up and after circling the field a few times made a perfect landing—about fifty feet up. After that he came down quickly and as the ship hit the ground the old rotary Le-Rhone motor kept right on spinning across the field. The wings folded up like those of a tired pigeon and the fuselage broke in three places and bent up like an old broken-down donkey. The wheels went up over the head of the pilot, who looked alarmed, but wasn't hurt.

I learned something every day. Soon after I had started there a mechanic named Porter was cranking an OX Travel Air and forgot to look at the throttle to make sure it was closed. It was unfortunately half open and the minute the engine caught hold the ship started chasing him. I grabbed a wing tip, but that made it go in circles. The mechanic was too rattled to think about heading straight out, and kept just a few steps ahead of the whirling prop.

Of course, it could have been a serious affair, but I can remember how funny he looked with a greasy rag, that was half out of his pocket, streaming right out straight behind him and the prop almost catching it. He was swearing so hard and fast that that cut down his speed too. We would probably still be running around in circles if dear old Bill Ulbrich hadn't jumped in to cut the switch.

My solo was just another solo. Bill

climbed out and neither of us noticed that a landing gear strut was broken. Nothing gave way, though. I must have made my first good landings that day.

SOON after I had made my solo flight another fellow, I don't know his name, as he was never called anything but the Great Dane on the field, was about to go up for his solo flight. The inspector told him to make a spot landing, that is, to come to a dead stop at a given point. Where? Oh, right where the inspector was standing then. He was very nervous about making an accurate landing and thought of nothing else. The inspector forgot all about it and stayed right where he was.

The first thing he knew the student had circled the field and was about to sit down on top of him. The student couldn't see the inspector on account of the engine out front being in his way and the inspector was too petrified to move for a minute. Then he hopped out of the way and immediately there was a wing where he had been. He was refused his license and couldn't apply for another for ninety days, which didn't seem quite fair.

They were trying to teach us safety and I don't doubt that we were a wild lot and needed it. One day a fellow overshot the old Roosevelt Field and, passing over the gully between the two, came in at Curtiss Field, a mile away. Another boy came in so fast downwind that he had to hook a wing around a telegraph pole and spin around to slow down. Strange enough, he didn't hurt either himself or the ship, but they grounded him for two weeks as a lesson in caution in watching the wind direction.

They had initiated me when I arrived at the field, so when the next new student, a big Irishman named Meighan, came I was ready to give him his. He was about to step in the ship for his first flight when I went around front and began inspecting the prop very critically. He was, of course, interested in what seemed to be troubling me. I said I didn't think he ought to fly in the crate until someone got some more prop wash.

He was off in a minute to see if he could find some. Prop wash is the slang for the blast of air sent back by the whirling propeller. He want in the nearest hangar and asked for it. The guy in there knew it was a joke and told him he couldn't have any without getting a requisition for it, so off he went down to the office. They must have smiled when they wrote it out, but he never caught on.

Back he went to the hangar and the same fellow gave him a bucket to get it in and made believe look for it and then he said he guessed there wasn't any left and that Meighan had better go down to Curtiss Field for it. So he hopped in his car and tried all the shops and hangars there. In the last one a mechanic told him to stand by the tail of a ship that was on the line while he started the motor and catch all the prop wash he could in his pail. When it all was explained to him and he had to come back with a bucket of air he surely wanted my scalp.

One student soloed, was passed by the Department of Commerce, and bought an old OX Travel Air. An OX is a wartime motor and hardly very reliable. He flew the ship until one day the motor conked on him and he was lucky enough to get down on a farm okay. He couldn't get out again even when he fixed his motor on account of trees on three sides of the field and a brick wall on the fourth. We all told him the best thing to do was to take the wings off and tow her over to a bigger field and take off there. He said no, she was rigged just right and he didn't want to mess with her.

So he got an estimate on how much it would cost to rebuild the wall if he took it down. It was about three hundred dollars. He decided to take the bricks down himself and spent ten days doing it. He made an aperture several feet wider than his wing span. When he finally got in his ship to take off through the opening he had made he was so nervous that he ground looped the ship and headed straight for the part where the bricks were still standing. The farmer made him pay for the wall, you bet, and the ship was a total write-off.

Next month Eddie tells us of his coast-to-coast trip which broke the Junior Transcontinental Record. Don't fail to read this interesting account.

However, it was not only student pilots who made odd landings. Roger Williams at that time had been flying four or five years, but hadn't got the Transatlantic bug yet. This particular Sunday when there was a large crowd at the field he thought he would make such a short landing that he would astound everybody at his ability to set a ship down on a small space.

He did just that thing, only on the hangar roof. He would have passed over it neatly if a sudden up current hadn't shot his tail up, and the same thing happened as if you lifted up on one end of a seesaw, the nose went down. Jenny left both of her wings on the roof and Roger, awfully sore, went off muttering about his helluva fine landing.

There was another peculiar crackup when Emil Burgin was through using the Exclamation Point for refueling the Tree Musketeers and the Fokker was sold to someone who couldn't fly worth a darn. He started to land into the wind all right, but thinking he was going too fast, he began banking. When the wheels hit the ground he was crosswind and by the time he had lost most of his speed he was going downwind.

Then he hit a series of bumps and the last one bounced him right over on his back. Newspaper photographers flocked all around shooting pictures and mechanics threw a rope over the tail to hoist the ship back right side up again, and all this time no one had even thought about the pilot. I looked in and he was sitting in the cabin looking sort of puzzled-like.

Even Bill, my instructor, had had his forced landing down in Georgia. The only clear space was directly in front of a house, so he sat down there and didn't stop rolling until he was right up to the front porch. An old colored woman ran out the back door shouting, "Lawd, deliver me." He stayed in that town three weeks, but he never did see her again.

With the kind of equipment they flew you wonder how there were relatively so few washouts.

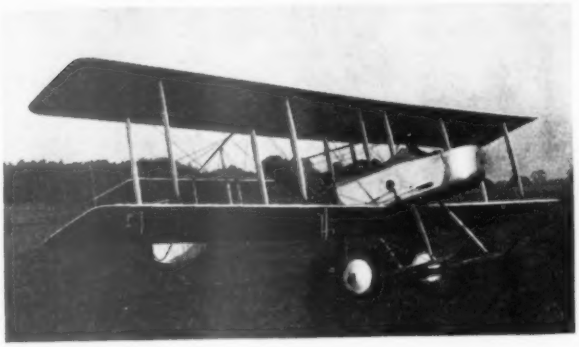
Most of the accidents were just comical, nobody ever seemed to be hurt. A hard landing in those days would scatter a ship with wooden longerons all over the field, whereas the same landing in a modern ship with good shock gear and steel tubing framework will just do a good healthy bounce.

IN the meantime I had learned to fly —somewhat. I could get around all right without doing any great damage to the ship or myself, but I had not enough hours to be doing passenger hauling and hadn't the money to buy additional time. So I tooked up with the American Air Express as a grease monkey to help in washing down ships and doing general engine work. I found out a good many things about motors I was glad to know later on.

Bud Clarke must have been crazy when he organized the outfit. His men weren't fliers and naturally weren't much of a success at running it. They must have sunk about fifty thousand dollars in the proposition with buying a Loening and the Stearman that Bud cracked up four times, and all the necessary equipment. They barnstormed at Rye for a while and then petered out.

Buddy got three baths in one day at New London the day of the Harvard-Yale regatta and nobody could hate salt water worse than he does. He was celebrating because Yale won and he went to Yale. He had been anchored in the river and in taking off forgot the anchor rope. He was just over a motor boat when his rope tightened and he dove in. The floats hit the roof of the launch and sheared it off. A fellow inside who had bent over to fix the engine stood up and found he had nothing but sky over him.

(*Continued on page* 64)



William Trap sends us these photographs of a Vickers Gun Bus (left) which saw service in 1915, and the Avro 504-K training plane (below) which was probably produced in greater quantities during the War than any other plane in the world.

Through the courtesy of Lieutenant William H. Neely, we are privileged to show you (left) one of the most interesting individual planes of the War. Lieutenant Robert M. Anderson, shown here, used this plane on October 7, 1918, when he and his observer, Lieutenant Woodville J. Rogers, located the famous Lost Battalion.

Famous Planes of the World War

Six more unusual photographs for your album

We are indebted to Lieutenant J. M. Richardson for these three photographs. At the right is shown a two-place Spad observation plane belonging to the First Squadron. These planes were not well liked and gave considerable trouble. This photograph taken at Ourches in the St. Mihiel sector shows Lieutenant Schauffler, pilot, and Lieutenant Hammond, observer.

An all metal German Junkers (above) which was found after the armistice. No one dared test it, so it was never determined whether the plane actually flew. Members of th 91st Squadron (right) inspect a German Roland pursuit plane. The Roland was twenty m.p.h. faster than the Fokker, but did not have a chance to show its worth before hostilities ceased.

Rubber Overshoes Form Effective Ice Eliminators

This experimental plane has the leading edges of the wings, tailsurfaces and landing struts jacketed with rubber ice-breakers. Below, a closeup of the wing installation.

ENGINEERS of the B. F. Goodrich Rubber Company, after waiting for weeks for favorable weather conditions, saw the first airplane to be equipped completely with ice-breaking equipment fly safely through supercooled clouds that would have forced an unprotected machine down in a few minutes.

The ice-breaking invention, dubbed an "overshoe," consists of a system of flexible rubber tubes arranged on the leading edges of wings, control surfaces, and landing gear. Normally the tubes, with the exception of those on bracing wires, are collapsed beneath their sheet-rubber covering.

When the plane flies through air containing water vapor that is at a temperature below freezing, ice, which forms when this supercooled vapor solidifies upon being disturbed, collects on the overshoes.

The pilot merely turns a valve, and compressed air is admitted to the rubber tubes, they expand, and the ice breaks and is carried away by air currents. Air is admitted and released periodically, so that a pulsating action results, the rate being variable.

Even bracing wires are equipped with ice-breaking jackets. In this case, air is normally kept in the single rubber tube at the leading edge to preserve the shape, and is released so that the tube collapses when ice is being removed. Airplane bracing wires which are only partly streamlined so that they can be reversed are made more perfect aerodynamically by the addition of the rubber ice-breaking strip, engineers have found.

The strip is attached to the wires by means of cement, and completely encloses them. Wing and control surface "overshoes" are held in place by special spring fasteners engaging in hooks attached to the wing spars. Those fitted to landing struts and similar parts are held by "zipper" hookless fasteners.

Air for the system is provided by the same tank that operates the starters, and is controlled through an automatic valve.

Because of the lightness of rubber, the ice remover does not add materially to the weight of an airplane. An attachment for preventing the accumulation of ice on the propeller has been perfected by Goodrich engineers. In connection with the "overshoe" development work, a special refrigerated wind tunnel, capable of creating artificial snow and sleet storms, has been built.

Balky Mule Wrecks Plane

MR. AND MRS. F. CRITZ HAHN of Cedar Rapids, Ia., described recently how they partially wrecked their airplane while dodging a mule as they attempted to land near Waycross, Ga.

Mr. Hahn, who was piloting the plane on a flight to Miami, said he attempted to land near Waycross for gasoline and that a Negro guiding a mule near a convict camp apparently became frightened and drove the animal directly in the path of the ship. Hahn turned the nose of the ship upward, but was so near the ground that the plane fell, tearing off a wing.

Neither he nor Mrs. Hahn were hurt, but the plane went to the shop for extensive repairs.

Strong Man Defies Planes

HANS RUCKER, 30-year-old German strong man, is proving what a big strong fellow he is by holding two airplanes by their tails. All Rucker needs to do this feat is an airport, two airplanes, some good strong rope and an iron ring.

The two planes in the picture tried vainly for several minutes to break loose from Rucker, but succeeded only in getting their tails up.

Novel Tailless Plane Demonstrated in England

ONE of the most interesting groups of aircraft recently exhibited at the Hendon, England, air show consisted of three queer "research" planes, each designed in a totally different way to provide a wide range between minimum and maximum speeds, powerful control right down to, and beyond, the point at which the aeroplane is stalled and exceptionally easy handling in flight.

Most like the normal aeroplane is the Handley Page "Gugnunc," a two-seater biplane utilizing to the full the peculiar properties of the famous Handley Page slotted wing, and possessing an astonishing range of speed—from 34 to 112½ miles an hour.

Second is the Cierva Autogiro, today well known, but still an object of intense interest with its four curved rotating vanes instead of the usual fixed

wings. There are few stranger sights in aviation than an autogiro in flight.

The bat-like "Pterodactyl" is almost equally startling in appearance. This machine, in its latest form is a two-three seater cabin monoplane. It has no tail, directional control being obtained through rudders mounted at the extreme tip of each wing, while the ailerons act also as elevators.

The engine and prop are mounted at the rear of the egg-shaped cabin, an arrangement eliminating noises caused by slipstream rushing against the cabin sides and providing the pilot with an uninterrupted view in almost every direction.

Why Are Students So Dumb?

Fear—Distrust—Stubbornness—Dislike. Do any of these qualities in students account for the repeated stupidity evidenced by them?

"JUST shove yo stick into de left han' koner and kick yo sef sum right ruddah, an you all will kum outta eny spin in de kentry."

The above advice was given to a 10 hour student by the airport janitor. The student had asked him how to get out of a spin and the Colored man had obliged with the above. Yeah—this may bring you out of a spin, sure—but it might also put you in a place where, "they lay you on your back and throw dirt in your face."

Will some kind person—anybody—tell me this? Why in !*X*@* will a student flyer go to an airport janitor, truck driver, or salesman, for advice of this kind, when he's paying a pilot to teach him how to fly. You don't know? Well, I'll just add your name to the list of the other ten thousand who are in the same fix. Every pilot-instructor in the country knows that this is going on, but they can't help themselves.

Students will insist on ground flying with a lot of palookas who think a turtleback is something they make soup out of. However, you "ain't heard nothin' yet." These same "students" will try to make their instructor believe that he told them something like the opening sentence to this article. Some day I hope they declare an "open season" on these students and allow instructors to use sawed off "three point nines."

Now—I'm going to give all of you "hope to be" pilots some good advice.

When you get your first lesson in flying, go home and build yourself a "stick" and some rudder pedals, and spend all the time you can with this home contraption, learning to synchronize the movements of your hands and feet. (This will keep you away from your janitor friends if it does nothing else.) The sooner you get into your head that flying is ninety per cent synchronization, and ten per cent common sense, the sooner your instructor will feel that his worries are over. (This may be a little bit exagerated but what's a few per cents between friends.) Concentrate on these controls until your use of the left pedal will automatically call for left stick.

Another little thing. Don't grab that stick as if it were the only thing between you and the ground, when you're riding with your instructor. Two or three fingers is plenty meat to have on those controls. When he wants that ship he wants it right now, not ten minutes from now.

Now when it comes to making left and right turns. Don't get the idea into your head that you have to use all the control you have. In the language of the day this is all "hooey."

The author, quite frankly, does not know but he believes that these pointed paragraphs may assist the student flyer.

by

CAPT. CHARLES W. PURCELL

Try this little stunt if you are in the habit of "over controlling." When you are ready to make your turn, fix the direction firmly in your mind. (This will take concentration. If you can't do that please turn to the next page and read the advertisements.) With the thought of direction in your mind, nine times out of ten the ship will make a wide turn in that said direction. This will show you just how much of the controls you can use and still turn your ship.

The muscles of your body take orders from the mind and they will automatically press against the controls to go in the direction wanted. Most instructors will tell you to plot your movements before making them and most students will do just the reverse.

And now we come to over confidence. Crack ups will come and crack ups will go but this will go on for ever—plus. Nothing in the cock-eyed world causes more accidents than over confidence. *Some* students have an over supply of this. Most of 'em climb into a ship with the intention of showing the instructor what smart guys they are.

Listen Rookie, the average instructor has seen a lot of smart guys. Yea, brother, they eventually attend the funerals of most of them. Every instructor also knows that the average "smart guy" is trying to cover up a lot of ignorance. Don't be that way.

I WOULD like to make a little statement to the youngsters who want to fly but have a little "itch" or "funny feeling" in the throat (which they mistake for fear). Tell your instructor of this. Don't be afraid to make a clean breast of the whole thing. He'll understand. Any instructor who is worth the powder to blow him up, has known a lot of fear in his day, and that's no bed time story. If he's a real old timer, he'll sit down and tell you what made his hair gray over the ears. (I don't want to knock a certain brand of "pre-war" motor, or I'd tell you of some real scares.)

If you acquaint your instructor with the fact that you have this complex you wont have it long. He can get rid of it for you. If he knows nothing of this "bug" he has a good chance of spoiling you by advancing too fast in his instruction. Sonny, always remember this, the only real coward in the world is the one who will not admit fear. They are real dyed in the wool yellow bellies.

Advanced students in flying, are sometimes not satisfied with the answer to a question they have asked their instructor. Your instructor might be a whiz of a pilot but a poor elocutionist. (I know several dozen of them who are funny that way.) Ask your instructor to take you up and demonstrate the question you asked, that is, if the question is reasonable. The demonstration to a flying question will always stay with you where the answer might go in one ear and out the other. Things learned in this way will never be forgotten.

There is one thing that I would like to pound into the head of every Man, Woman, (Especially) and child in the flying game. When you are winding up a motor, don't lean against the propeller when you ask for "contact." Step away from the prop when you say this sometimes fatal word, and don't go back to the prop until the man in the pit answers.

I get me several chills and fevers every time I see a rookie wind up a motor for somebody. Most of you bimbos won't have any respect for a prop until you see what they can do when they "sneak up on you." Did you ever turn the switch on your car and have the motor start. Well—what in the name of the seven brands of bootleg liquor is to stop your power plant from doing the same thing?

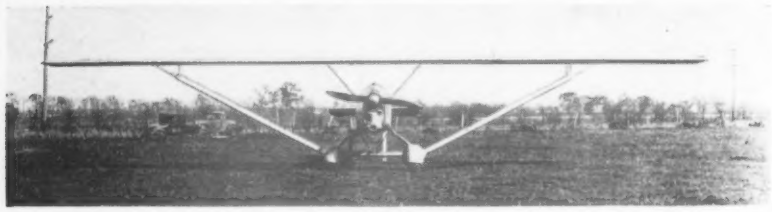
Remember this. An old time pilot can pick a rookie every time by the way he handles a prop. The rookie pilot seems to get the idea that he has to swagger a little as he approaches the prop. Sonny, you might bite a hole through a piece of crystalized dynamite, or you might fly a cold motor, but you can't be disrespectful to a prop for long.

Speaking of cold motors reminds me of another "fooey" habit, and that's taking off with a cold motor. If you have no respect for yourself, you might think of the people on the field, when you are tempted to do this little thing. This stunt has washed out many a ship and so-called pilot, along with other

(*Continue on page* 61)

Novel Lightplane Has Features of Soaring Glider

Illustrated on this month's cover



THE Brown plane was developed to secure a plane which would perform well with little power. As the photograph shows it is a light two place tandem sesquiplane equipped with a wing of very high-aspect ratio which with its clean lines tends to accomplish the purpose of the designer.

The twenty-four inch chord of the wing permits of a very simple type of wing construction. The wing structure consists of a single wide box spar made of plywood, an aluminum leading edge, and trailing edge ribs secured to the rear of the spar and covered with fabric. The drag bracing is taken care of by the plywood coving of the box spar which also provides the major part of the surface of the wing itself.

The ailerons were at first attached to the inclined lift struts but were later transferred to the wing tips where their effectiveness was greatly increased.

The upper wing has a span of 50 ft. and a chord of 2 ft., giving an aspect-ratio of 25 which compares quite favorably with that of a sailplane. As the plane has a wing loading of 8.5 lbs. per sq. ft. the ship has some of the performance characteristics of a sailplane.

It was first designed for a low powered engine but since no successful light powered motor was available at a reasonable price at the time it was built it was redesigned for a 90 h.p. Cirrus Hi-drive engine.

The ship has been flight tested and has successfully demonstrated many of the characteristics desired by the builder. It climbs well and has a high cruising speed. Pilots find it a very interesting ship to fly. Its stability characteristics are good and it handles very well.

Specifications

Span	50 feet
Length	22 ft.-10 in.
Height	8 ft.-7 in.
Gross weight	1440 lbs.
Weight empty	1000 lbs.
Disposable load	440 lbs.
Gas capacity	12 gal.
Oil capacity	3 gal.
High speed	105 m.p.h.
Cruising speed	85 m.p.h.
Stalling speed	52 m.p.h.
Climb	90 ft./min.

Ben E. Brown, the designer of this plane demonstrates some of its unusual design features.

Unlicensed Planes Unwelcome

NEW JERSEY is up in arms against the unlicensed airplane. Sanger Green, member of the New Jersey State Aviation commission, says there are 108 unlicensed aircraft in New Jersey, and that they constitute a hazard. Most of them, he said, have been barred from other states. The commission has been asked to consider a resolution prohibiting the operation of unlicensed planes.

Plane Lands at Filling Station

SHORT of gas and unable to find the town airport, a pilot landed his De Haviland "Moth" in the main street of Menindie, a small southeastern Australian town.

After landing the pilot taxied up to a gasoline station, filled up at the pump with standard car gas, and took-off from the unusual runway to continue on the broken journey.

Structural Failure Blamed for Travel-Air Crash

ON July 2nd, the newspapers carried an account of an airplane crash at Hamilton, Ontario, on the previous day, in which five people were killed.

Inquiry revealed the fact that the plane was a six place cabin monoplane manufactured by the Travel Air Manufacturing Co., now a division of Curtiss-Wright.

According to the Hamilton Chamber of Commerce, "the Court of Inquiry sitting on behalf of the Department of National Defense has definitely found that the accident was due to structural failure in the small ribs supporting the leading edge of the right hand wing. These were crushed due to a slight power dive followed by a zoom. The fabric was broken by the force of the air and the aluminum cover on the front part of the wing was torn back to the first main spar. The fabric from the main spar to the rear spar was then torn in strips which were plainly seen as the machine zoomed."

Inasmuch as a similar six place Travel Air crashed in California on July 5th, killing six people, it would seem that the Department of Commerce would do well to withdraw these planes from service until investigation of their structural safety can be made.

A similar course of procedure taken after the Knute Rockne crash resulted in the removal of a number of such dangerous planes from public service.

Speedy New English Fighters

THE new Hawker "Fury" single-seater interceptor fighter with which one Royal Air Force squadron has already been equipped, gave proof of its immense abilities in speed and rate of climb recently, when three of them flew from their home base at Tangmere, in Sussex, to Hendon aerodrome, nearly seventy miles away, in seventeen minutes.

In spite of a wind that was rather across the course than on the tail, they averaged, therefore, about 240 miles an hour, and the feat becomes still more striking when the height reached during the flight—no less than 7,000 feet—is taken into account.

With full load on board the "Furies" attain a speed in level flight of 214 miles an hour. During a recent trial the "Fury" flight of three planes climbed to more than 3,000 feet in ninety seconds. Actually these machines are tested to attain a height of 20,000 feet in nine minutes while still maintaining a forward speed of 150 miles an hour.

Performance of this kind means that they are better fitted than any of their predecessors for the difficult task of intercepting enemy raiders on the way to attack London, work that may involve ascent from the aerodrome to a height of two or three miles, finding the enemy and bringing him to combat, all within the space of fifteen minutes.

Instructors Are Queer Birds

Cross, crabby, irresponsible and irrepressible instructors—they're all part of the game. But when it takes twenty-one teachers to turn out two students, you can be sure that there is something wrong

by MARJORIE MAY LESSER

LIKE everything else in this world, flying is easy—that is, after one knows how! It is the learning how that brings trials and tribulations and turns one's hair gray. So much has been said and written about the troubles instructors have with students that it is high time a few tales were told about the troubles students have with instructors.

The school I attended was continually changing its chief pilots with the result that I had four instructors before I soloed, and since then I have had time in acrobatics and check outs with about a half dozen others.

I learned to fly in 1928. At that time we were using a terrible little field—so small that if the wind was out of the east or west, landings could not be made without danger of cracking up.

The school's equipment was two planes which stood exposed to the elements day and night because there was no hangar. There was one instructor during the week and another who flew only on Saturdays and Sundays. The student enrollment consisted of five fellows and myself.

Marjorie May Lesser, above, struggled through the teachings of ten.

I had never been near an airplane until I went for the fifteen minute hop which sold me the idea of learning to fly. I heard them talking about airlerons and flippers and sticks and guns, but it all meant nothing to me.

The instructor was one of these quiet men who seemed to think that if I followed him with the controls for awhile I would learn how to fly. He did not even tell me "what made what happen." All he said was, "When we get in the air take ahold of the stick and watch what I do. And don't freeze the controls or I'll hit you over the head with a sandbag."

I climbed into the cockpit and my education in the art of flying started. The first two lessons were uneventful; by asking questions after each trip I learned a little about banking and turning.

During my third lesson I received my first shock. I had the controls and was concentrating on the amount of bank in the turn I was endeavoring to make. Suddenly something hit me over the head. I let go of everything and slumped down in my seat. The plane went into a dive, then a climb and I saw the horizon disappear and reappear so fast that I thought it was going to hit me in the face. All sorts of dives, climbs and turns followed with astonishing rapidity. Then we were in level flight again. I turned around and looked at my instructor and he grinned at me—he did not seem very angry at my freezing the controls and I certainly felt relieved.

When we landed he asked me how I had liked it. "Great!" I said. "What was it?"

(*Continued on page* 58)

by ANN BOHRER

MUCH has been written about the different types of students taking flight training but rarely anything about the flight instructors themselves. I have found through experience that there is as much difference in instructors as there is in students. No two instructors are exactly alike, at least I have yet to find two who are and I have had eleven instructors during the period of my flight training.

My first lesson in the air was with an instructor who would do most of the flying himself, whether he was one foot off the ground or at an altitude of ten thousand feet; whether the student was just beginning his training or was taking advanced instruction. This instructor was taking no chances. One could feel him on the controls at all times.

I would be asked to make a turn and invariably it would be executed perfectly—too perfectly for a beginner. This aroused my suspicion. I found that by releasing the controls, the ship would continue making a perfect turn and, still without any help from me, straighten out into a straight line of flight. My landings were three-pointers and my take-offs very good. Either the instructor was doing all the flying and was just flattering me or the ship must be hypnotized. It soon became very evident that it was not the latter.

Ann Bohrer, below, had eleven so-called instructors before being satisfied.

Several of us decided we could make faster progress if allowed to do at least part of the flying ourselves, so I met my second instructor.

He was the extreme opposite which was just as bad, if not worse, as his students flew as they pleased most of the time which made it an easy matter for them to develop bad air habits. This instructor was a naturally jolly chap and delighted in singing to me while I skidded about on my turns or slipped in on them. If the windshield needed wiping, he would unstrap, stand up in the cockpit and proceed to give the windshield a good sound scrubbing. Not as yet having developed the necessary "feel" of a ship, I could only hope I had the nose of the plane in the proper position on the horizon. When my instructor wasn't singing, he was talking all sorts of nonsense.

At the termination of my lessons he would tell me what a wonderful flier I was. It turned out I was a very bad flier. The aerial house-cleanings and concerts were not benefiting me.

I next chose an instructor who would have been very good had it not been for his uncontrollable temper. He had a temper like a wild cat. If I taxed his patience just a trifle too much, he would fly into a rage and become exceedingly sarcastic. Being too angry to even turn around in his cockpit to accept my flight ticket at the end of my lesson, he would merely reach for the ticket over his

(*Continued on page* 59)

Reconditioned Fokkers Again in Service

COL. CLARENCE M. YOUNG, Assistant Secretary of Commerce for Aeronautics, recently issued the following statement:

"Of the 36 Fokker tri-motor planes of the 1929 series that were temporarily withdrawn from scheduled passenger service early in May and thoroughly inspected for present condition of airworthiness, 20 have thus far been reconditioned, pronounced airworthy and returned to passenger-carrying service. In addition, 5 others are in the process of being reconditioned and will be presented to the Department for approval in due course.

"The 20 planes now in service have been thoroughly reconditioned. This work included the removal of plywood wing covering for inspection purposes, which in the majority of cases indicated the necessity for the replacement of some interior components, reinforcement of some of the structure to which the plywood covering was attached, and the renewal of all or parts of the covering. In addition, the ailerons in all cases were statically balanced by counter weights in order to overcome vibration of the wing or aileron under certain speed and air conditions."

Flying Golf—The Latest Sport

"FLYING GOLF" is here! The new Kellett Autogiro threatens a revolution in golf as well as in flying. Pilot Guy Miller recently flew his Kellett to the Locust Grove Golf Club, in New Jersey, and then played a game of golf, using the autogiro to fly from stroke to stroke.

The ability of this sportsman's aircraft to land and take off with perfect safety amidst the difficulties and obstructions of the golf course was demonstrated fully. Pilot Miller drove off, climbed into the autogiro and flew it to where his ball had alighted. He landed so close to the ball that he was embarrassed by the whirling rotor blades while making his second shot, but he kept to this "land anywhere" standard while following the ball all around the course.

Over Manhattan With A Dead Engine

I had always wondered what happened when the motor quit — now I know.

By GIOVANNI CIRILLINO.

The author with the disabled plane on the beach.

EVER since my uncle and I were brought from Europe to appear in the Follies, my life has been a series of one theatrical contract after another, never affording me the time and the opportunity to fly until the Summer of 1930.

I had signed to open with "Hell's Angels" at the Chinese Theatre in Hollywood, with only two performances a day. Upon my arrival I found all Hollywood air-minded. The following afternoon, after rehearsal, in the company of my friend Bill, who was playing the same theatre with me, we hurried to Glendale airport.

After looking the ships over, I found a little blue Fleet, which appealed to me because of its size, as I am small, only a half pint. I had many wonderful trips in that plane, staying up an hour and a half at a time, flying over old Mexico and the surrounding country.

During my air travels, which took considerable hundreds out of my salary, the question kept constantly coming to me—"What would you do if the engine stopped?" I had voiced it at different times to my pilot and others, but their answers or perhaps my ability to understand had never cleared the matter in my mind.

Upon my return to New York, finding myself with an open date and Sunday just ahead of me, I decided to go to Roosevelt Field, longing to see Manhattan from the air and to obtain some aerial pictures of the city with my Garflex.

The only available ship at the moment was one with a lot of time on the engine, but, feeling assured of the capabilities of my pilot, John Charleson, I climbed in the front seat of the open bi-plane, armed with my camera. We taxied down the field, and in a second we were off. The nose swung around, and we were headed for Manhattan.

Looking ahead we saw a low layer of white clouds. Hoping to get above them and find a rift large enough to get a picture of the city, Charleson started to climb, which was a lucky thing for us. Looking out over the side at this great height, catching marvelous glimpses now and then of the metropolis below, the old question again persisted in my thought, when all of a sudden from a deafening roar there became a great calm.

Glancing quickly at the throttle I saw it was wide open. The engine had stopped!

For a second my heart stood still, and a thrill crept up my spine, as I realized I was about to live the answer to my query. The quiet of the next second was broken by the calm voice from the back seat, telling me to remove my goggles, as we turned the nose around toward the beaches at Coney Island. I removed the goggles and loosened myself from the belt, casting my eyes about, ready for the emergency at hand.

The ground was slowly coming up to meet us, as we glided silently in search of an uninhabited beach. Then I noticed in front of us a small, shell-spotted shore, but to my surprise, Charleson swung out to sea, then turned back again facing the beach and into the wind.

The next thing, the ship started to slip sideways, until the right wing was standing straight up and the wind on the left side nearly blew me out of the ship. Then Charleson reversed the performance—rolling me to the other side.

Looking below, all I could see was water. The sandy beach was too far ahead. We wouldn't reach it, I felt sure. I was getting ready to swim, but Charleson knowing the gliding angle, did not seem at all worried. The next thing I noticed the breakers were seemingly almost touching the wheels —then a slight cushiony impact, and we rolled over the sand to a stop.

Charleson, hopping out of the ship, calmly said, "I'm sorry, Cirillino."

I stood by the ship, while he went to the nearest 'phone and called the hangar for a mechanic whom my friends drove to our landing spot. The mechanic found a broken rocker arm, which was quickly repaired. Getting into the ship, we made a perfect take-off and headed toward Roosevelt Field, with my question answered.

When I have grown a few more inches and can have the time and Mr. Charleson's promise to instruct me, I am going to learn to fly.

Would You Jump?

Motor failure over the mountains. Would you risk a forced landing or bail out?

By "T-2003"

PUT yourself in this situation, in any capacity.

A plane load of passengers bound on one of the many scheduled runs that traverse this country. A competent pilot, perhaps a co-pilot and steward. A goodly number of passengers, about half of them women.

One moment sailing serenely along, and then,—something wrong. A violent storm with impassable flying weather, broken ailerons, rudder or elevators or their controls, engine failure over the mountains,—you can use your own imagination, but things look bad in this hypothetical case. That cool grizzled old fellow near the door hums softly to himself and keeps his eye on the pilot. The other passengers look at each other askance. The pilot, or his co-partner, comes into the passenger cabin and,—but let's break off to ask some questions.

Should parachutes be available for these passengers and the crew?

If they were, would these same passengers use them without delay? Would *all* the passengers use them? How about that hysterical woman back of the pilot's cabin or that glassy eyed, soft looking fellow who stares straight ahead as the pilot leans over to shout in his ear?

Would the pilot run for the door and use his 'chute without waiting to see his passengers clear of the plane?

How about you, reader, would you use your parachute? Would you step out into space, then pull the rip-cord and float down to safety?

COPYING the actions of an Inquiring Reporter on a large metropolitan daily I ventured out after first hand information. My questions were casual ones, I tried to catch my subjects off guard so that a truthful answer would be forthcoming instead of a studied one which was not the truthful reaction of the one being interviewed.

In the course of my interviews I contacted the Operations Managers or other officials of four air-lines and one flying school, ten transport pilots, ten people who habitually travel by air on scheduled lines, ten who would like to travel in this manner but who have never had the opportunity to do so and ten who frankly admitted they had no desire to travel by air, to fly in any other manner or to have anything to do with airplanes and who said they wouldn't be dragged, etc.,—you've met the kind.

To tell the truth I interviewed many more than the 45 people already mentioned, as about three out of every five whom I essayed to question appeared to fall in the class of those who would like to travel by air but who have never had the opportunity to do so.

All four flying managers were against the use of parachutes in connection with transport flying, although all admitted the worth of these aerial life preservers in military flying, in instruction work or in flying mail.

The replies of my other victims I have tabulated. Those of men or women were so much the same that sex, apparently, makes no difference in point of view or attitude toward the use of parachutes.

CLASS A were ten pilots who had had considerable experience flying passenger transports on scheduled runs, all of them reliable, dependable fellows of mature judgment. Curiously enough, seven of them had never been in a tight place while flying passengers.

Class B consisted of five men and five women. Three of these were professional people, four in business, one a housewife, one man a mechanic and the tenth air traveler announced herself as a beautician.

Class C consisted of six men and four women. Of these, three men were mechanics, one in business, one a clerical worker and one a professional man. Two of the four women were housewives, one a clerical worker and the other a business woman.

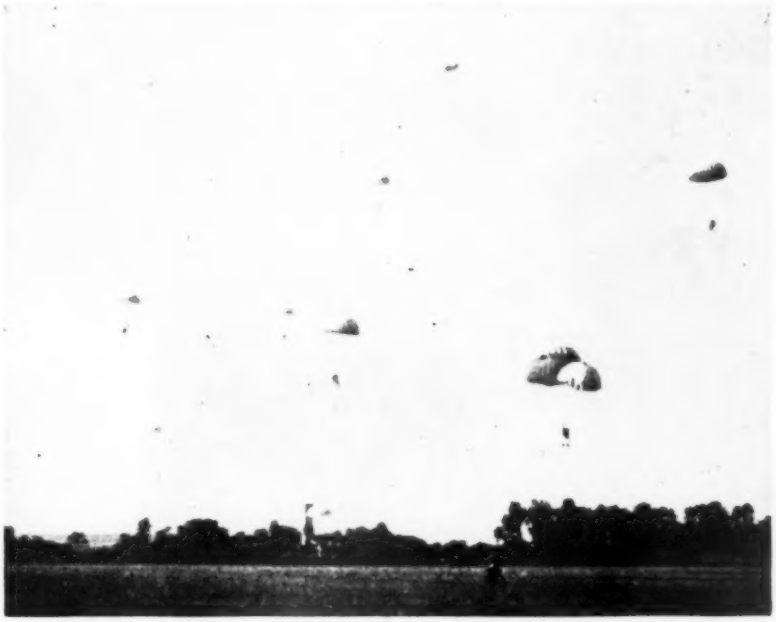
Class D consisted of four men and six women. I could find no mechanics who admitted a dislike or distrust for air travel; of the four men in Class D two owned their own business, and two were clerical workers. Four of the six women were housewives, one was a clerical worker and the other a nurse. The four men all owned their own homes and were heads of families.

It was just by chance that I found six women who professed a dislike for the air. Two of the women in Class C had husbands in Class D. According to my experience in this interview which began soon after the "Rockne crash," men with families and owning their own homes were more prone to be groundlings than their wives.

Apparently mechanics are the most self-reliant and open minded on the subject of aviation in all its phases. Their replies to my questions were either direct with a sensible reason or were thoughtful and analytical. Probably the reason not more of them flew was that of expense, as they were accustomed to using their cars to cover long distances.

For the purpose of easy reference I have marked some of the blocks in my tabulations alphabetically.

There was a proviso attached to the



These nine jumpers stepped out of a passenger plane just a few seconds before this picture was taken. Note the first 'chute almost on the ground and the last jumper at the top whose parachute has not yet opened.

Class		Would you use your parachute if you had to?			Do you think the other passengers would use theirs?			Should parachutes be provided on transports?		
		Yes	No	Doubtful	Yes	No	Doubtful	Yes	No	Doubtful
A	Ten Transport Pilots.....	[a] 10	0	0	7	2	1	2	7	[b] 1
B	Ten Habitual Air Travelers.....	[c] 7	2	1	[c] 5	2	3	5	2	3
C	Ten who would like to travel by Air	6	1	3	6	0	4	6	2	2
D	Ten who have no desire to Fly.....	4	3	3	5	4	1	4	4	2

This chart shows the reaction of forty people to three important questions that have been the basis for much discussion among flyers.

answers indicated by "a." "Provided all passengers were free of the plane" these ten pilots added in qualifying their willingness to use parachutes in time of emergency. Five of these ten had been mail pilots, and eight of the ten had been Army or Navy pilots. These stated that for the first year or so of passenger hauling they felt decidedly uncomfortable without the parachute that had always been with them on their military, naval or mail flying.

At first the presence of passengers for whom they were responsible worried them considerably but this feeling gradually wore off until now it is just part of their work to take the

These are the nine navy and marine corps men who demonstrated the ease with which passengers can escape from a crowded transport plane in parachutes.

safety of the passengers into consideration. "Although" added one of the pilots, "lately we've been getting more instructions concerning the comfort of the passengers than we've been getting on their safety."

I asked another question of these pilots. "If everyone were given the opportunity to jump and several refused, would you then bail out?"

Three said they would, then immediately retracted that statement. "I honestly don't know what I'd do then, it would depend upon circumstances," was the answer of one young pilot. "I hope I'm never faced with such a situation."

Two pilots refused to answer, became suspicious and could no longer be interviewed. Five pilots stated immediately that they would stick with the plane.

"Much as I would want to jump, my place would be with the plane," stated a pilot a bit older than average, incidentally the father of three children. "It would be too dangerous a precedent to have pilots jump, leaving their passengers behind them. It's one of those things you couldn't do. Not with paying passengers. With members of the crew, say in a military bomber, where these passengers are trained to obey their leader, conditions are different and refusal to obey the pilot's order to jump should not jeopardize the pilot's life. But passengers embark on the plane with faith in its safety. I'm no hero or posing as one, but in this game there's things you can do and things that just aren't done."

The lad that was doubtful whether parachutes should be used on transports (indicated by "b") had just engaged in a spirited discussion on this subject with some of his fellows, who had taken the discussion away from him and made him their audience. He had heard so many pros and cons that he stated his mind was not made up on the subject.

From the answers marked "c" we see that seasoned air travellers are more confident of their own ability to obey the command "JUMP" than they are of their fellow travellers. Incidentally the 5 air travellers answering "Yes" to the second question were the same who answered "Yes" to the third. The others who doubted the willingness of the other fellow to use his parachute did not desire parachutes as standard airplane equipment, thus indicating their unwillingness to have any of the others left behind when the order came to clear the plane.

Comparisons of figures in the answers of Classes B, C and D indicate as much a distrust of parachutes as of airplanes in those who were afraid to fly.

One airway operator commented on this fact.

"It shows conclusively," said he, "that the presence of parachutes contributes in no small way to prospective passengers' distrust in air travel. The air is still a bit more mysterious than the sea to Mr. and Mrs. Public. Life belts and boats on a ship are taken as a matter of course, but not aerial life preservers on an airplane.

"The time will come when, through

(*Continued on page* 65)

3,437 Airplanes Made in 1930

AIRCRAFT, engines and equipment valued at $61,211,197 were produced for both civil and military purposes during the calendar year 1930, according to a survey completed by the Aeronautics Branch of the Department of Commerce.

Aircraft manufactured during 1930 included 3,437 airplanes, of which 1,078 were monoplanes and 2,359 biplanes. Eleven airships and balloons were produced as well as 4,356 engines, 236 sets of pontoons, 8,032 propellers and 3,818 parachutes.

Reader Designs and Builds Gliders

WITHOUT doubt, Raymond Snyder of Kingston, New York, is the most modest builder of gliders you will find in many a long day.

Here's the story. Mr. Snyder sent us a snapshot with the briefest of notes as follows:

"Here is a picture of glider I built. It has a 36-foot span and is 16 feet long."

It was a very interesting looking glider, but why in the world didn't he furnish some information about it?

Well, a letter was written asking for more facts. The response was

The ultility glider built from Mr. Snyder's plans.

scarcely longer than the original letter. Laconic is the right adjective.

"The glider was designed by myself," writes the taciturn Mr. Snyder. "It has a 36-foot span and is 16 feet long. It is all of wood construction except the fittings and covering and weighs about 200 pounds. It was test flown at the local airport and washed out its landing gear and nose. I hope to repair it soon.

"Enclosed is a photograph of another glider, also designed and built

The designer with his hang glider.

by myself. It is very successful and has made many flights."

So there you are! We show you pictures of both gliders, but you'll have to imagine the details on the second one which looks to us to be an adaptation of the Chanute hang-glider.

D. C. Planes in New Garb

A NEW uniform color combination, consisting of maroon, international orange, black and aluminum has been adopted for all airplanes of the Aeronautics Branch of the Department of Commerce.

The tops of the wings will be painted international orange. The metal cowling on the front part of the airplanes, and the wheel fairings are to be maroon, while the landing gear and under struts will be black. The fuselage of all planes and the lower wings on biplanes will be aluminum. The letters "U. S." are to be painted on the wings in addition to the license number.

The colors formerly used were circe red for the fuselage, empennage and cowling, black for landing gear and under struts, desert sand color for wings except the top surface of upper wings, which was international orange.

The new combination will be of a more lasting nature and at the same time will form a better preservative for the fabric covering. The change in color combination will not be made on all planes immediately, but will be effected as repainting is required.

The Jacobs Lightplane—A Neat Two-Seater Monoplane

This view of the Jacobs plane was taken before the finishing touches were added. The windscreen and landing gear streamlines were put on later.

THE following letter accompanied this photograph of a new plane built by Mr. S. R. Jacobs:

"This is the new two place plane manufactured by the Jacobs Machine and Airplane Works. The plane is powered with a six cylinder forty-five h. p. Anzani engine, or can be powered with the Szekely or fifty h. p. Jacobs engines.

"Its weight empty is 590 lbs. and the weight loaded is 1,030 lbs. The gasoline capacity is 15 gallons; wing span, 28 ft.; cord, 5 ft., and length, 20 ft. The plane will sell around $1,500."

The Flying Chop Suey King

AFTER having flown across three continents, covering 12,420 kilometers in a little more than two hundred flying hours, Zensaku Azuma, Pasadena's flying Japanese restaurant man, is back in his Fair Oaks Avenue chop suey restaurant at Pasadena, Cal.

Azuma saved enough money in the business to purchase a plane. He flew to New York City, from where the plane was taken by boat to England. Then he flew across Europe and Siberia to his native country, Japan. He made no attempt to break speed or distance records, but he declares he took many chances when landing, especially in Siberian towns.

Mr. Azuma and his plane at Los Angeles after completing his world tour.

Once near the city of Tomsk in Siberia he had flown across Lake Baigal and then prepared to land in what he thought was a beautiful green field. But he discovered just in time that the area which he had mistaken for a field was really another lake covered with green moss and scum.

This plucky restaurant man flew in all kinds of weather. In northern Europe and Siberia he would at times pass through torrential downpours of rain and at other times he encountered winds of hurricane force, while at certain latitudes flurries of snow even in mid-summer obscured his vision.

At the Mikado's capital he was greeted by a representative of the emperor, the acting ambassador from the United States, and other officials. Honors were conferred upon him by the emperor of Japan, the Japanese Automobile Association, various chambers of commerce, and other organizations.

While in Japan, Azuma made flights to various Japanese islands and cities, conferred with people interested in promoting aviation, and did his bit toward starting Japanese interests in the plan of handling import trade in American airplanes and airplane parts. He addressed several meetings, urging development of commercial flying between Japan, Manila, Honolulu and California.

Azuma returned from Japan to California by boat and was given a splendid welcome in Los Angeles. He likewise found it difficult to get back into his work at Pasadena for several days because so many people crowded in to see him and congratulate him.

Air "Fan" Registers Kick

JUST before the recent Army air maneuvers Brigadier-General Benjamin D. Foulois, Assistant Chief of the Air Corps, received the following communication from an Air Corps *fan* residing in Brooklyn, N. Y.:

"We note with a certain amount of amusement but with no particular anticipation the idiotic plan of flying 600 airplanes over New York on May 21st in some kind of a publicity demonstration. Your name is mentioned in today's papers in connection with it.

"We do not suppose that it ever occurs to the naive and childlike minds who plan these affairs that while it may be nice, entertaining, inspiring and impressive spectacle for street corner loafers to goggle at—it will be considered nothing less than a nuisance by about three million business men, and nothing short of a damned outrage by about two million others. Did you ever try to make a telephone call with six or eight of the things outside the window?

"We plan to be out of town on those days but we hope you will have a very nice party over New York in your noble scientific experiment. It is one of the surest methods of getting laws passed regarding mufflers too, so have a fine time and if you want to stage an even more popular party, drop dollar bills and spring flowers and ticker tape over the city.

"Awfully sorry not to be with you on the 21st of May, but I'm sure that our unemployed will enjoy it immensely.

Yours for air-hooey,

_____ _____."

Taxis and Planes Cooperate

TEAMING up to get business, a drive-yourself automobile company of Knoxville, Tennessee, and an airplane company have devised a novel hook-up whereby both companies are cashing in liberally.

Customers of the auto company save their receipts until they have accumulated ten dollars' worth. Ten dollars' worth of receipts entitle the holder to a free airplane ride.

There is further co-operation in taking passengers to and from the air field that is bringing good results.

New Catapult Hurls Planes Aloft

TREMENDOUS possibilities in extending the use of aeroplanes over difficult country, where adequate aerodrome space cannot be found, are inherent in the extraordinary land catapult device which was demonstrated recently in England.

The apparatus hurled a big twin-engined Vickers "Virginia" night bomber, weighing more than seven tons, into the air in three seconds after a forward run of about 100 feet, as compared with the usual take-off run of this kind of aircraft of between 900 and 1,000 feet.

The apparatus is operated by compressed air, the motors revolving a drum, round which is a cable. This cable is led to a pulley in the ground placed some distance in front of the apparatus and thence back to an attachment under the airplane. As soon as the drum begins to turn the airplane is pulled forward, running on the wheels of its own undercarriage and with the tail supported in the correct flying attitude on a wheeled trolley.

A seven-ton bomber has just been catapulted.

Only three seconds are needed to accelerate a big machine, weighing up to ten tons, from rest to about sixty miles an hour, the compressed air motors speeding up in that brief space of time from rest to 2,500 revolutions a minute. At that rate of revolution the power developed by the motors, which individually are no larger than a big round cushion, is no less than 4,000 h. p.!

The effect of sudden application of such enormous power is awe-inspiring. The airplane is literally thrown into the air like a stone hurled by a giant, and before the unaccustomed onlooker realizes that the launch has taken place the bomber is aloft hundreds of yards away, the ear-splitting roar of the compressed air motors sounding like a salvo of artillery.

Steam and cordite may also be used in the motors instead of compressed air. It is estimated that at the moment of launching the pull on the catapult is equal to twenty tons. Secure anchorage is, therefore, essential, but the inventors have prepared plans to make the entire device completely mobile, so that it can be included in the equipment of an army on the move.

How Not to Break Into Aviation

The Experience of CHARLES COSME

IN 1928 I became a charter member of a flying club sponsored by a national society for the advancement of Aviation. I had long awaited an opportunity to belong to an aero club as I realized that I could learn to fly just as well and cheaper than at a flying school.

We paid only thirteen dollars per hour for dual whereas most schools charged from twenty to thirty-five dollars. A great saving indeed and very welcome to the prospective student of average means.

The club started off in good style, and within a year we had purchased an OX-5 American Eagle and started giving dual time to those who could afford it. As I could not afford it at the time, it was a year before I could start my flight training.

I'll never forget that first hop as long as I live. I lived twenty-one miles from the field and had to take a train to get there. On that never-to-be-forgotten day I had become so engrossed in my thoughts of the coming experience that I passed the station I was to get off at before I knew it. Then followed a three mile hike back to the flying field through plowed fields.

As there were two other members ahead of me, I had to wait. Finally my turn came. It was with a feeling of the fulfillment of all my dreams that I clambered into the rear cockpit and nervously buckled my safety belt. A few preliminary questions and instructions from the instructor and we were taxying out into the wind. The rattle of the landing gear and tailskid over the rough field seemed strange to my unaccustomed ears.

The good old OX-5 roared, the tail lifted and for the first time in my young life I left the ground. What impressed me mostly was the terrific wind and roaring. My cheeks trembled as violently as the struts and wingtips when I ventured to peer from behind the wind shield. I felt like shouting as an ungovernable wave of exhilaration swept over me. In vain did I search for the field and then I realized that I was lost over my home field. The instructor waggled the stick as a signal for me to take the controls and my attention was thereafter devoted to keeping the ship on an even keel.

That first half hour seemed to me to last only five minutes. When the ship bumped roughly upon landing, I visualized a noseover and gripped the cowling tightly. So much for the first hop.

In due time I soloed and put in an hour and a half before I was forced to discontinue on account of the depletion of my ready cash. Slim chance I had now of getting that private license unless I did something about it. I became restless. I wanted to fly. So I decided to satisfy my restlessness by purchasing an old OX-5 Jenny, for which I borrowed and paid three hundred dollars. My intention was to pile up about fifty hours and sell her. I had much to learn. With the purchase of that old crate began my series of misfortunes. Had I used a little discretion in the beginning, I would not have borrowed that money or bought that ship.

To begin with, I lost my job. This put me in a very embarrassing position as at that very moment I needed money to get the Jenny in flying condition. Fortunately for me, I was not paying storage for the ship as I left it in the open behind some hangars. That was my undoing for first my gasoline gauge and then my altimeter disappeared. This all happened in January of 1930 which was a bitterly cold month. It was no picnic to patch the rents in the fuselage and wings in the biting wind which thickened the dope and tore the pieces of fabric out of my numbed fingers. To aggravate matters, I had no one to help me. One day I caught three boys using by lower wings for diving boards.

One day I was accosted on the field by a bootlegger who offered me fifty dollars a trip to fly booze. I turned him down in spite of the fact that I needed money badly.

It must be taken into consideration that I was only seventeen and quite inexperienced in the ways of the world. To add to that, I knew no one in the industry to advise me. Of course I had my own ideas but lacked the capital to put them to trial. I even thought of flying the Jenny cross-country and down into Spanish speaking countries, as I am of Spanish descent and can speak the language fluently. Alas, I was due for a disappointment.

In the first place, it would be a miracle if that old OX-5 engine ran for three hours without conking, and the fittings were rusted, to boot. But to all this I shut my eyes. I didn't think of the ship's incapabilities, but only of the flights. When I think now of my impossible ideas I laugh to myself.

Since I lost my job I couldn't visit the ship as often as I wished to. Gradually I became disgusted with myself and the whole thing and decided to sell it and be done with it. Within a week a man came to my home and offered me a hundred and fifty dollars for the ship. Why, I had paid twice that amount for her and hadn't even flown her. He then led me to believe that someone had flown the ship and in landing had washed out the lower wings.

Like a darned fool I believed him and agreed to let him have her at the price he offered at a loss to me of a

(*Continued on page* 60)

A Tour Through an Airplane Factory

Jim continues his inspection under the guidance of Bill, the production manager, and learns more about the mysteries of modern airplane construction.

by

U. C. McMILLER*

The second assembly line where the plane begins to look like something.

JIM MORRISY hadn't kept up with the developments of aviation since the days when we were buddies together in one of the pursuit squadrons during the war. I was interested, therefore, to hear his comments after a flight in one of our new production ships.

"It's a dandy, Bill," Jim enthused. "I didn't know they built busses like these."

"You haven't seen the half of it," I answered. "Why don't you come out to our factory and see how we build 'em?"

The next morning Jim showed up at the plant and we started our tour of inspection. I explained the general layout of the factory to Jim before going into any detailed description of the materials or processes employed, and then we followed the work through the various departments—stock room, rib and wing assembly and woodworking departments.

Just as we reached the fuselage department, the welders shut off their torches and we watched while they removed the fuselage from the jig.

"As you see, when the fuselage comes out of the jig, it looks rather incomplete, doesn't it?"

"Yes, it does, Bill, although you can't prove anything by me on this new production stuff."

The main aisle showing the first and second assembly.

"See where they are taking the fuselage? That is Welding Station Number Two. The turtle back and a great deal of other welding is done here. We find it faster to handle it this way and it also simplifies the building of the fuselage jig quite a bit. Furthermore, it makes it possible to get more fuselages through the department by splitting up the welding into two stations. Savvy?"

"Me savvy."

"THE Machine Shop is the next place we'll visit. This department is one of the sore spots in our factory and probably is in most factories. When airplane production builds up somewhere near the automobile, this condition will be remedied.

"The trouble is that we are compelled to do an enormous variety of work on ordinary machinery. To install the correct machinery to do all the jobs done here would cost an awful pile of money. At the same time, this machinery wouldn't be useful for more than perhaps an hour or two a week.

"Whenever we can, we have our special jobs done in other machine shops that are especially equipped for the particular job. This cuts our costs, although it means a more careful inspection. Wish I had everything under my thumb instead. A punch-press and automatic lathe are what I need most."

Just then a sharp rat-tat-tat effectually ended any attempt at conversation and then ceased as suddenly as it began.

"Gosh! What's that?" queried a startled Jim. "That sounded more like No-Man's Land than an airplane factory."

The surprised look on Jim's face was comical.

"That's what you call a nibbler," I replied, "and if you step over here you can see the noisy little fellow at work."

I told the mechanic to feed a piece of scrap sheet steel through it so Jim could see how it ran. Another burst of rat-tat-tats smote our ears.

"See, Jim. That little punch jumps up and down and each time it comes down it takes out a little half moon of metal. With this machine we are able to cut out any irregular shape of sheet steel that we want. A grinder takes off the little scallops along the edges and the part is finished."

"Clever all right," said Jim, "but if there is anything else like that around here, you better give me warning. I thought I was back in France for a minute."

"We've got something almost like it down here in the Sheet Metal Department. Let's go over there now and I'll show you a little about our gas-tanks, cowlings, streamliners, and so forth. Got any questions before we leave the steel?"

"Yes,—where do you make the landing gear for this job?"

"We don't," I answered. "The type of landing gear we use is made for us in the east. The reason for this is that it is heat-treated and there are no ovens here large enough to handle it."

"What is heat-treating?" popped the inquisitive Jim.

"That is a process of heating, quenching and cooling that makes possible the doubling of the strength of steel. In this way we are able to cut the weight of our landing gear in half. Understand, Jim?"

"Understand. Now where are we going next? Did you say Sheet Metal?"

"Yes—and in doing so we leave steel behind and have to do with aluminum and dural."

"Bill! Will you come down to earth and explain these things from the ground up? What the Sam Hill is dural, or whatever you call it?"

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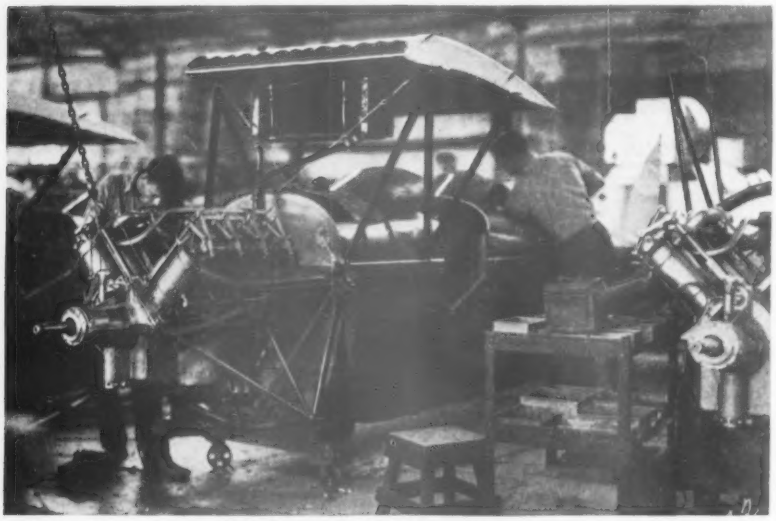
* Former pilot, Royal Flying Corps and U. S. Marine Corps; airplane and glider designer; former Production Manager, Mohawk Aircraft Corp.

"Dural is short for duralumin, Jim. It is aluminum which by the addition of certain elements and processes becomes about as strong as low carbon steel, but stays about the same weight as aluminum. It's wonderful staff for airplane builders in some ways, but it has its drawbacks, too. One is that it cannot be welded successfully.

"The only way it can be worked is by riveting, which is slow and expensive, and also makes possible the cracking up of the metal. It seems to be very susceptible to this under vibration. 'All metal' jobs have to be watched for this very thing all the time. Duralumin is sort of a general term, but I think you have a good enough idea of what I mean, haven't you, Jim?"



Mounting the engine and center section

"Yes, that's about all I can get ahold of at one time. Now go ahead with what goes on here."

"Well, as I said before, we make our gas tanks, cowlings, streamliners, and so forth here. The dural isn't used very much on the open jobs—mostly when we build a cabin ship. Many airplane companies have their tanks made for them. We are fortunate here in having some very good aluminum welders, so we make our own."

"Why is it that you can weld aluminum, but not this dural stuff you speak of?" was Jim's next question.

"Dural can be welded, Jim, but the trouble is that the heat of the welding flame drives out some of the elements that make it dural and then it becomes aluminum, which, as you know yourself, hasn't much strength."

"That tank full of water over there is where we test the gas and oil tanks with air pressure. These benches here are for the forming operations. We have hardwood blocks hollowed out to the desired shapes. A piece of soft temper aluminum is clamped on the block and then the mechanic shapes the aluminum down into the hollow with an air-hammer. When these boys get going with the air-hammers you can't hear yourself think around this place. The nibbler over in the Machine Shop doesn't get a look-in with these babies.

"Some day I hope I can cut out the noise as well as the labor cost by installing a hydraulic press. Then we'll take our forms and press these things into shape.

"Let's go over to the Covering and Upholstering now. I am beginning to get hungry and I want that order for an airplane pretty quick."

Jim gave me his best "fish-eye," but said nothing, so I figured I was making progress.

"WE WON'T waste any time on the Upholstering—nothing much to that anyway. As to the covering, there are several points of interest there. The first one is the material we use nowadays. We used to talk about linen, but this fabric is long fibre closely woven cotton—cheaper and better than linen. We use what is known as the envelope style of covering, which means that as much as possible is sewn on machines and then slipped on to the wing or fuselage like a mitten. About all that is left is the hand sewing at the ends and the lock-stitching."

"That's what holds the fabric to the ribs, isn't it?"

"That's right, Jim, you remember a few things, don't you?"

"Yeah. Mostly a few," was Jim's disgusted reply. "What's next now?"

"Dope room next. We put on four coats of clear dope, and one with aluminum pigment in it. That," I said, anticipating the inquisitive Jim again, "Is to keep the sun's rays from reaching the fabric—they cause premature deterioration.

"At the present time we are putting on all coats of dope by hand. I am making some changes now, which will permit spraying after the first two. I can cut my labor cost a little here, but the first two coats will always go on by hand, to be sure that the dope gets well into the fabric."

"By the way, what is dope?" asked Jim.

"Suppose I tell you that it is liquid celluloid. Does that sound all right?"

"Yes, that seems to be about what it is," affirmed Jim.

"Pyralin is about the same thing too," I added. "Now let's take a look at the Spray Room. The sheet metal walls and these doors are to comply with the insurance rules. If anything ever caught fire in this part of the shop, the doors close automatically and keep the fire from getting out into the shop. The fans that you see in the wall are for carrying the spray and fumes out of the room. Men couldn't work in there very long if this wasn't done."

"At the present time we are using lacquer to finish our ships with. On some jobs we put on pigmented dope. The two finishes have their respective advantages and disadvantages. In general lacquer seems to give a better finish, but doesn't weather quite as well as the pigmented dope."

"If I buy a ship, which would you recommend me to have?"

"I refuse to recommend, Jim. Both are good, if properly applied—and we put them on exactly as the manufacturers tell us. Take whatever you happen to get, is my advice.

"While we are here, I also want you to see what is done to the inside of this airplane. All wood work, wings, and so forth, come in here and get sprayed with an oil-base varnish before covering. This is to keep moisture out of the wood and glue. The inside of the fuselage is also given a coat of this stuff."

"You mean the inside of the tubing?"

"Yes, Jim. There are little holes drilled through the longeron walls at every point where one of the cross or diagonal members is to be welded on. I was going to show you about this while we were down in the Welding Department, but couldn't because that fuselage was already welded up.

"These holes allow the oil to go all through the fuselage, and if there is any place that moisture could get in through a weld, this stuff closes up the hole. The outside of the fuselage is protected by dope-proof paint. Ordinary paints are apt to blister if dope comes in contact with them. This would expose the steel underneath and make rusting possible.

"What do you think of the way we build these airplanes, now, Jim? Think you'll buy one from me?"

"Wouldn't you like to know?" was Jim's evasion, but I would have bet my last dime that he was already figuring out where he would go first when he got it.

"What's left to see now?" he asked. "I'm getting hungry too."

"Motor Shop and then the Assembly Line," I replied. We mount our motors on the motor mount, track the propeller, install and connect the oil tank,

(*Continued on page* 60)

A Record Breaking Plane

This sleek monoplane is the latest Bernard "Grand Raid" type.

THE world's long distance record, left at 5,465 miles by Bossoutrot and Rossi on the Bleriot 110 monoplane in February, has been beaten by the Bernard 80 G.R. monoplane powered with an Hispano Suiza 650 H.P. water cooled engine and piloted by Paillard and Mermoz.

These pilots covered a distance of 5,650 miles without refueling in 59 hours 30 minutes of flight. The Bernard monoplane shown here weighed 19,800 lbs.

Airline Has Unique Record

PERHAPS the most progressive freight air line in the world is now being operated in New Guinea by an Australian company. This line, Guinea Airways, has since its inception three years ago carried 5,000,000 lb. of cargo and 5,000 passengers without a casualty.

When it is pointed out that such items as two dredges and a power plant weighing 2,500 tons, and a 500 ton crushing plant are on the waiting list it is no wonder that the company expects to carry 8,000 tons or more in the next three years.

To handle such heavy and bulky cargo, special Junkers all-metal airplanes are being used, one type is the Junkers G31, powered by 3 Pratt and Whitney "Hornets" and capable of carrying a 3½-ton load. Recently a motor car and tractor were flown inland to the Bulolo Gold Dredging Co., which company's total output of gold is handled by Guinea Airways.

All the flying is carried out over dense jungle, safe operation being made possible by the provision of six emergency landing fields over a 70-mile section.

Jumper Uses Four 'Chutes

SAFETY first is no idle slogan where Joe Crane is concerned. Not content with one parachute, he took four of them along when he jumped from a height of about 4,000 feet above Roosevelt Field, Long Island.

Three of the 'chutes are functioning as shown in this photograph. The fourth one hasn't opened yet, but Joe should worry!

Traffic Lights to Guide Passenger Planes

A BUSY air passenger line is going to imitate railroads in controlling traffic. Five "block signals" with red lights to be turned on to signal pilots to land will be installed along the New York-Philadelphia-Washington route of the Ludington line. The system will have the double purpose of stopping traffic in the face of bad weather and flagging pilots to land for passengers enroute. It will supplement radio communication.

To control thirty planes flying north and south on a daily schedule, signals will be installed at Baltimore, Washington, Camden and Trenton. Each "block" will consist of two "guns" with short, thick barrels, one controlling northbound traffic and the other for southbound planes.

"Glideritis"—A Most Satisfactory Disease

I HAD been interested in gliding for several months before I saw my first glider. It was a home-made affair, painted red, that the experienced flyer would have laughed at but to my enthusiastic eye it seemed the last word in motorless aircraft. It was not hard to picture myself sitting in the seat, begoggled and helmeted, waving to my friends far below who would marvel at my ability to sail back and forth at will.

I was brought back to earth by my friend who owned the "crate," explaining to me that it was impossible to fly it as the landing wires had been strained by a rough landing and it was necessary to put on new ones in order to obtain the proper dihedral.

About a week later I saw my first glider meet at Bayside, L. I. Many of the leading pilots of the country were there and I experienced that feeling of envy that anyone who cannot fly feels towards a fellow man who has successfully conquered the air. I was so favorably impressed by the enthusiastic approval of the crowd that I decided to get right into this business of gliding.

The opportunity to take my first flight came a few days later from my friend who owned the home-made glider. The day that I was to meet him and his friends at the glider port was clear with a stiff wind blowing. Arriving at the field before all the members had assembled, I was permitted to balance the glider on its skid facing into the wind. I appreciated this as only a novice can and it was not long before I felt that it was possible for me to "hop-off."

By this time all the members had arrived and the launching crew was selected. After about ten flights had been made my friend asked me if I would like to try my luck as an aviator. I replied in the affirmative and as soon as the glider was brought into position I was strapped into the seat and given a few instructions.

In the meantime the shock cord had been attached and two men has taken their position at the rear of the glider on the hold-back rope. The controls were placed in neutral and my instructions were to keep them in that position. I smiled confidently as the command "walk out'" was given but as the three men on each side of the shock cord were given the order to "run" I experienced a feeling of apprehension which I forgot a few seconds later when I heard the command "let go"!

There was a sudden rush of air and I realized that I was passing over the heads of the launching crew. I don't believe that I shall ever feel as helpless as I did during the next few seconds. Fortunately I held the stick in neutral—in fact it would have taken a couple of men to loosen my grip. There were several times that I used lateral control which I had learned when I balanced the ship on the ground earlier in the afternoon but I sure avoided moving the stick in any other direction.

My next sensation was one of relief for I saw that the glider was but a few feet from the ground. The landing was surprisingly easy, and as I undid my safety belt and got off the seat I felt that Lindbergh and I had something in common. To say that I was proud would be putting it mildly.

My joy at having mastered the air was short lived for as I stepped from the seat a sudden gust of wind caught the glider and threw it over on its back. The rudder and one wing were demolished but it seems that things like this happen occasionally in glider clubs and the members were very nice about it.

We placed the wrecked craft on the trailer and left for home, and as we rode along I found that I had developed an acute case of "glideritis" from which I hope I never recover.

—John A. Leavitt.

The Hopping Off Place

THEY don't even dignify it by calling it a city, this little community of Harbor Grace, Newfoundland, but it makes the front pages of the nation's newspapers just about as frequently as any town in North America, with the possible exceptions of New York and Chicago.

What manner of a place is it—this jumping off place for practically every flier who attempts the Atlantic ocean?

As you approach Harbor Grace from the air, the first thing you see is the landing field. No town in sight yet, for that is beneath the cliffs on the edges of Conception Bay, and the airport is a mountain pasture transformed, nestling between two low hills on the top of the cliffs. The field is well-marked and it has a 4,000-foot runway. This is the only land airport in all Newfoundland.

Harbor Grace is primarily a mining and fishing village, but it now has visions of becoming the trans-Atlantic airport for Canada, and possibly the United States. Those who are interested in the airport, headed by Herman Archibald, have done well. To begin with, they fashioned the landing field only after moving rocks enough to build a skyscraper, and uprooting thousands of blueberry bushes. They fenced it off and smoothed it, mostly by hand. Brock and Schlee contributed funds to aid in its construction, and this year Ruth Nichols helped to pay for improvements. Harbor Grace has done the rest.

Now the field is pasture for a flock of sheep and goats awaiting the next trans-Atlantic team.

There is none of the excitement at Harbor Grace that surrounds a trans-Atlantic take-off, say, at Roosevelt Field, N. Y. The editor of the weekly newspaper, the *Harbor Grace Standard*, tells about it in his journal a few days ahead, if he gets the news in time. A few farmer boys gallop their stocky ponies, hardly bigger than the great Newfoundland dogs, across the moors to the airport and possibly a hundred citizens from the town beneath the cliffs drive or climb on foot up the winding white roads to the head of the runway. If the men have work to do, they do not come.

The fact that daring fliers take their lives in their hands over the North Atlantic does not particularly excite these folks, who have been accustomed throughout their history to violent and sudden destruction at the whim of the North Atlantic. So they greet the fliers casually when they arrive, just as they gather at the railroad station to meet the triweekly train, and with less excitement than when they hurry down to the waterside to greet the returning fishermen and inspect their catch.

Then when the takeoff day arrives, they wish the fliers good luck and wave them off in the same manner as they send their schooners out to the Banks.

New Type Rocket Engine

A NEW type of airplane engine called a Rocket engine has just been patented by J. M. Biggs, a mechanic of Helena, Ark., for which he claims a speed of 500 miles per hour, or more, and which he says may fly around the world in 24 hours, all the way in daylight.

Instead of a heavy complicated engine using a revolving propeller, this new type of Rocket engine has a reciprocating propeller, and is so designed that the full force of the explosion in the cylinder aided by the exhaust strikes the air direct, forcing the plane forward with greater speed and safety, like a sky rocket.

Air Beacon Becomes Sun Dial

A NOCTURNAL sun-dial, using light instead of shadow to tell the time and expanded to relatively gigantic proportions, is soon to be installed by the municipality of Guayaquil, Republic of Ecuador. The light source will be an aviation beacon which, revolving once every 12 hours, will indicate the time by illuminating surrounding landmarks at the same time each night.

Impulses from a Telechron clock will be transmitted to a solenoid-operated turning mechanism every five seconds. Thus the beacon, as it turns, will indicate the time by shining on various landmarks at certain definitely known times each night.

Electrical Shock Recorder Warns Pilot of Danger

The miniature unit on the lower wing tip of a biplane.

FIVE thimble size robot units and a Grid-Glow tube took off on a mail plane recently in the first attempt to keep a pilot informed about the condition of his wings during flight and avert the possibility of a structural failure in mid-air.

A red light on the instrument board connected to the robots will warn the pilot when danger threatens. As soon as the pilot sees the red light, he knows that the safe thing to do is to land at once.

The structure of wings hidden under fabric or metal are known to weaken from several causes and a knowledge of their behavior in flight is practically the only vital operating information which a pilot does not have before him on his instrument board.

The robots make use of the inertia of tiny weights. They ride in pairs in vertical holes which look like tiny cockpits bored in a block of aluminum about the size of a cake of hand soap. Springs "strap" them into place.

The latest experiment is a further development of previous tests in which robots indicate only shock to the plane's structure. Now they indicate danger as a result of relations between the tip of the wings and the cockpit.

An airplane is ordinarily a rigid structure. During flight when the air currents strike the plane, the tips of the wings are subjected to tremendous shocks.

By placing a robot on the tip of each wing and one in the cockpit, they can be adjusted so that when the difference between the shock on the tip of the wing and the shock on the cockpit goes beyond a certain limit, determined experimentally, the Grid-Glow tube on the instrument board will light. This tells the pilot that conditions for flying are becoming unsafe, and he should land at once.

The plane experimented on was a biplane and needed five robots, one on each of the four wing tips and one in the cockpit. A monoplane would require only three, one on the tip of each wing and one in the cockpit.

Later, robots might be installed at several points along the wing, and perhaps, along the tail surfaces. Doubtless they will be streamlined or placed inside the structure. So far the project is not finished and will take considerable time before it is placed on the market commercially. However, when ready for general use, it is not unlikely that they will be a part of the equipment of every plane just as much as a compass and altimeter.

The cabin shock recorder and amplifying tubes take up very little room in the plane.

Questions and Answers Department

THIS department is at the service of our readers just so long as their questions are of general interest. We solicit inquiries on informative subjects dealing with aircraft construction, flight problems, operation of aircraft, maintenance and similar questions of educational character.

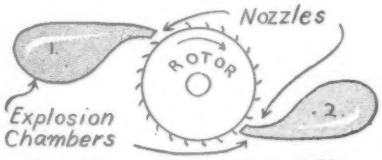
However, we reserve the right to accept or reject any questions that, according to our judgment, are not suitable for these columns. Address letters to Questions and Answers Department, POPULAR AVIATION, 608 S. Dearborn St., Chicago, Ill.

* * *

QUESTION:—H. C. James, Carmel, Cal. *Why has not a successful engine been put on the market for both automobiles and airplanes that works on the turbine or rotary principle? It looks to me that an engine of this type would develop a lot more power, would weigh only about one-third as much and on account of doing away with pistons, connecting rods and crankshafts would be entirely free from vibration. Can you tell me why an engine of this type cannot be made?*

Answer:—A NUMBER of engineers have experimented with gasoline and oil turbines from time to time with indifferent results. Probably the best known of these men is Hans Holzworth who devised a gasoline turbine consisting of a carborundum rotor surrounded by combustion pockets.

A turbine requires a steady stream of combustion products, hence these pockets acted alternately upon the rotor, one pocket compressing and



The basic principle of the gas turbine

igniting the mixture while the others delivered the hot gases to the rotor. The complication and weight of this system offset any advantage that might have resulted from the turbine principle.

Any turbine, whether gasoline or steam, must run at a very high velocity, hence a turbine suitable for airplane propulsion would require a rotative speed of 40,000 R.P.M. or even higher. This high speed spinning, unfortunately, develops a terrific gyrostatic stress when the plane is being maneuvered, and this defect practically strikes the turbine out of the picture.

For example, when the nose goes down for descent, the gyrostatic couple will instantly raise one of the wing tips. If sufficient aileron surface is provided for overcoming this trouble, then excessive stresses will be thrown into the turbine rotor shaft and the bearings. Again, the high speed calls for a delicate reduction gear to the propeller, and so on through a multitude of difficulties.

All questions of general interest on any phase of aviation will be answered authoritatively by Popular Aviation's Technical Staff.

* * *

QUESTION:—John A. Seidel, Sparta, Wis. *Can you tell me where I can obtain some fairly reliable dope on the LeRhone rotary and the Thomas-Morse scout of war-time fame? Your April issue contained a picture of one of these ships.*

Answer:—THE rotating cylinder LeRhone aviation engine is described in Rathbun's "Aeronautic Engines," Page A, "Aviation Engines," and in several other books dating 1917 to 1919. We do not recall any description of the Thomas-Morse scout in book form but there was a considerable amount of attention paid to it by 1918-1919 aeronautic magazines, which are available in many libraries.

* * *

QUESTION:—C. J. Lester, Durant, Okla. *Will you please give me the correct pronunciation of the following aeronautical words:—1. Empanage. 2. Decalage. 3. Velie. 4. Duralumin. 5. Diesel. 6. Sesquiplane. 7. Pfalz. 8. Breguet?*

Answer:—SO FAR as we know, there is no standardized pronunciation for several of the words, hence we can only give you the pronunciations now in common use. Some of the words are of French derivation, but the French pronunciation has become modified through long useage in this country.

1. Om-pan-azh. 2. Decka-lazh. 3. Vee-lee. 4. Door-aloom-in. 5. Dee-sell. 6. Ses-qui-plane. 7. Fahlts. 8. Bragay.

A sesquiplane is a biplane having a small lower wing, shorter and narrower than the upper wing. It is also called a "one-and-a-half plane." The Sikorsky and Buhl are examples of this construction. It is claimed, that because of the narrow chord of the lower wing that there is less interference between wings and that the efficiency approaches monoplane values.

* * *

QUESTION:—Charles M. Kranz, Chicago, Ill. *Why are rubber cords used in place of steel springs on the landing gear of airplanes? It would seem that steel spring landing gears would be the best except possibly that they might be a little heavy.*

Answer:—RUBBER cords act in two capacities. First, they provide the necessary "give" or springiness for controlling the movement of the wheels. Second, rubber acts like a shock absorber, and pound for pound, is capable of absorbing and dissipating a great deal more energy than steel.

The internal friction or "hysteresis" of rubber is very high, and as this is the property that opposes long continued oscillations after a hard landing it is obvious that rubber is an excellent material for the purpose.

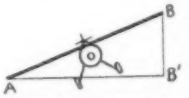
Steel springs have been used in the past both on the Bleriot and Nieuport monoplanes, but as they were not continued on these machines it is likely that they were inferior to rubber springs. The steel springs on the Nieuport greatly resembled the springs on the Model "T" Ford, the bundle of laminations being connected to the ship at the center with the wheel axles attached at both ends.

* * *

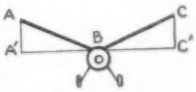
QUESTION:—H. A. McLane, Denver, Colo. *I have heard that it takes more power to fly a ship on a turn than along a straight flight path. If this is so, why is so much power absorbed?*

Answer:—WHEN a ship is banked up on a turn, less of the wing surface is effective because only a small percentage of the wing acts in a vertical plane. This being equivalent to increasing the loading on the wing, naturally calls for more power.

In the same way, the effective sur-



In banking, the wing length AB is reduced to an effective length AB' on the horizontal



The length ABC of a dihedral wing is reduced to the effective length A'BC' on the horizontal

face of a dihedral wing takes more power than a straight wing because a part of the wing no longer lifts in a vertical direction. The lift force of a wing is always perpendicular to its surface, and if dihedral or banking is given to the wing, then it is evident that only a part of the lift is available for carrying the load.

* * *

QUESTION:—N. J. Eisenman, Denmark, Wis. *I am considering building a glider or light-plane, but I find that Sitka or aircraft spruce is hard to get and very expensive in my locality. I would like to know whether basswood can be successfully substituted for spruce in glider construction, and I would also like to know whether there is any other kind of wood that can be*

safely and satisfactorily substituted. Also, where can I get information on carving propellers?

Answer:—BASSWOOD is considerably weaker than spruce, especially in resisting shock, hence it is not suitable for the main members. It can be used for rib webs or other thin parts where the wood is subject to splitting by nails. We do not recommend this wood for beams or longerons.

White ash is probably the best substitute for spruce where great stiffness, resistance to fracture and where the parts are to be bent after steaming. Ash, however, is somewhat heavier than spruce but because of its great strength this can be partly overcome by making the members proportionately smaller. Biltmore ash can also be used, but as black ash is lacking in stiffness it should not be used.

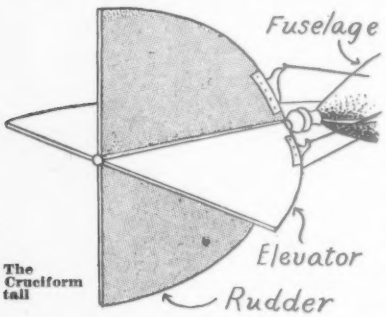
Good Norway pine is the second choice but is about 9 per cent weaker than spruce, making larger members necessary.

Various articles have appeared from time to time on carving propellers, but we know of no book on this particular subject that would be of much value. The design of propellers is quite a complicated subject, and we suggest that it would be far better and cheaper in the long run to buy your propellers of some reliable maker.

* * *

QUESTION:—J. L. Braun, Evansville, Ind. *What is a "cruciform tail"? I have heard this term mentioned, but so far as I know, I have never seen one.*

Answer:—THE cruciform tail, first presented by Santos Dumont on the "Demoiselle" monoplane and later adopted by Breguet and others, is a form of tail in which



The Cruciform tail

the rudder and stabilizer surfaces form one integral, cross-like part and are hinged to the end of the fuselage by a ball and socket joint.

The tail moves up and down for longitudinal control and sidewise for steering. It is not usual to have a fixed vertical fin or stabilizer when this sort of control surface is used.

* * *

QUESTION:—Thomas F. Priest, Tangleflags, Sask. *I am writing to ask you what the educational requirements for an American Transport Pilot are.*

Answer:—ACCORDING to advice from the U. S. Department of Commerce, there are no preliminary educational requirements except the usual knowledge of reading, writing and arithmetic.

* * *

QUESTION:—James Beck, Mansfield, Ohio. *I would like to know when a glider becomes a plane. That is, I want to know how much power a glider can have before a pilot's license is required.*

Answer:—A GLIDER becomes an airplane as soon as a power plant is installed regardless of the amount of power. Whether the engine develops one-tenth goat power or 1,000 horsepower makes no difference. And, of course, a pilot's license would be required in either case.

* * *

QUESTION:—Geo. Barton, Milwaukee, Wis. *If kerosene contains more heat and power than gasoline, then why is it not used in airplane engines?*

Answer:—GASOLINE contains more heat per pound than kerosene, but because of its higher gravity, kerosene contains more heat per gallon. As it is the heat per pound that rules, it is evident that gasoline is the most satisfactory aeronautic fuel. Again, there are many difficulties encountered in vaporizing kerosene in a carbureting engine so that its use would be confined to compression ignition engines of the Diesel type.

* * *

QUESTION:—Frank Hackenschmidt, New Orleans, La. *What is meant by the "safety factor" of an airplane and how is this figure determined?*

Answer:—SAFETY factor refers to the strength of an airplane structure. If the strength of the frame were only equal to the actual load placed upon it, then there would be danger of collapse with even a slight overload or a small defect in the material.

For this reason, it is customary to make the framework several times stronger than necessary for the estimated load to take care of excessive loadings, and the number of times greater the actual strength, the higher will be the safety factor. Thus, if the wings are capable of carrying eight times the estimated normal weight, then the safety factor is eight. Some of the parts are designed with a safety factor as low as four, while other important parts may show a safety factor as high as 12 or even higher.

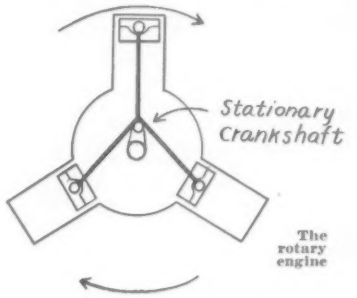
A part carrying a vibrating load or a part that is subject to sudden and severe shocks is given a higher safety factor than when that part carries a steady definite load. If the material is brittle or easily injured then the safety factor is higher than with a tougher, stronger material, and so on.

* * *

QUESTION:—Ralph Portham, Mount Morris, N. Y. *In your next issue will you please answer the question for me in the Question and Answer Department, "How does the rotary engine work"?*

Answer:—THE rotary engine, more properly the rotating cylinder engine, is simply a type of radial engine in which the cylinders revolve about a stationary crankshaft. The propeller is carried on an extension of the crankcase, while the engine mounting is attached to the hollow crankshaft.

Since relative motion between the cylinders and crankshaft is necessary, it makes no difference whether the



The rotary engine

cylinders turn about the crankshaft or whether the cylinders are stationary with a revolving crankshaft. (Page Mr. Einstein of relativity fame.)

There is a considerable amount of difference in detail between the Gnome, LeRhone and Clerget rotaries. The early Gnome drew the mixture into the crankcase through a hollow crankshaft, and from the case the mixture was drawn through a valve in the piston head. The exhaust valve was in the head of the cylinder.

The later model, the "Monosoupape" Gnome, or single valve Gnome had one valve in the head while ports cut in the cylinder wall and controlled by the piston movement performed the functions of the other valve.

The LeRhone had an inlet and exhaust valve in the cylinder head to which the mixture was supplied by radial copper manifolds. Picture an ordinary radial engine with rotary cylinders and you have a picture of the rotating cylinder engine.

* * *

QUESTION:—W. G. Brady, Baltimore, Md. *Can biplane wings be made self-supporting like the wings of a monoplane? If this is the case, why don't the makers do away with the bracing between the wings and reduce the head resistance?*

Answer:—IT IS possible to make biplane wings on the cantilever principle, and it was done with several models developed during the end of the war. However, in the attempt to get full advantage of a high aspect ratio, the chord and depth of the wing section are reduced so that the problem is more difficult with a biplane than a monoplane. Whether the elimination of the interplane bracing of the biplane would improve its

(*Continued on page 57*)

Airlines Are Being Thoroughly Inspected

SPECIALLY qualified inspectors of the Aeronautics Branch of the Department of Commerce for the past nine months, have been conducting thorough examinations of the scheduled air passenger lines that have applied to the Department of Commerce for certificates to operate passenger service in interstate commerce, it was recently stated by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

"Air line inspectors inquire into every phase of air line operation that would have a bearing on the public safety," said Col. Young.

"Perhaps unknown to the pilot or crew of an air liner, one of our inspectors will take his place in the cabin of a passenger airplane and, from the vantage point of a passenger, but from the viewpoint of a skilled airman, he will observe the operating methods of the crew of the aircraft. Furthermore, the inspector makes it a point to fly with every pilot who operates between division points, and to observe not only his technique, but his general judgment, experience and ability to handle air line transportation.

"At the terminals, the inspector The competency of the employes is investigated, the adequacy of the shop closely observes the ground operations. equipment, the local inspection systems employed on aircraft and engines—all are inquired into for the purpose of seeing that they do not fall below the standard specified by the Department.

"Using an Aeronautics Branch airplane, the inspector flies the route under inspection and lands in every intermediate field and airport along the route. This is done to satisfy him that the landing facilities offered by these fields and airports are adequate for the type of aircraft employed on the line.

"Upon completion of the inspection, the air line inspector takes his findings direct to the heads of the company operating the line and points out any instances that in his opinion need correction or modification."

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349 Private English Planes

THE number of privately owned aircraft is steadily increasing in Great Britain. It is reported that 349 airplanes are owned by 312 persons. Two of the owners possess four airplanes each, five own three each and 26 have two each; on the other hand four pairs of owners are listed as sharing one plane.

The planes range from very small single-place land planes to large three-engined flying boats. The D. H. "Moth" biplane is shown to be the most popular private plane in Great Britain, the list citing 179 of this type. Next in number is the D. H. "Puss Moth" with 50, followed by Avro "Avians" (28), and Blackburn "Bluebirds" (19).

Adventures in the Frozen Wilds of Canada

by JAMES MONTAGNES

CAPTAIN D. S. BONDURANT is an aviator who is as much at home piloting a plane over unknown territory in the Canadian hinterland as he is flying along a regular air mail route. He can make friends with Indians and Eskimos as readily as he can with fellow pilots at any airport.

Born in Cairo, Illinois, this auburn haired pilot with a pumpkin-red mous-

Bondurant and his plane on an unnamed lake in Northern Quebec.

tache, is reputed to have been for some half dozen or more years the only American citizen allowed to fly Canadian transport planes. Coming to the Dominion after a barnstorming career following his service with the American Air Force in France, he has been flying in the northland ever since.

Bondurant's first contact with the unknown northland came during the gold rush days of 1925-26, when every plane of every description was bundled to the hopping off points on the transcontinental railway across Northern Ontario and Quebec. Here the jovial pilot with his southern drawl flew prospectors and freight in and out of the bush in an old war time ship.

Winter and summer he flew, heading farther north of the railway each day as more and more men came in to stake their fortune in the unexplored bushland. It was hard flying in all sorts of weather, with the possibilities of weeks of privation and hardship in case of a crash or forced landing in that isolated country.

On one flight he had a crash. He had set out in forty-five below zero weather, with his ski-equipped plane. Something went wrong when twelve miles from the outpost. The machine came down and sank its nose in a ten foot bank of snow. Bondurant was stranded. Help would not come. There was nothing to do but get back to the outpost.

So he set out in forty-five below zero, wearing only his heavy flying kit, no skiis, no snowshoes. He tramped through the bush, often sinking deep in snowdrifts. But he made the post that day. He came in black, his face frozen, his hands frozen, and his feet hardly able to carry him.

They thawed him out till his little moustache became sprightly again. Then Bondurant set out with a gang, a small stove, a tent, and many tools, to dig out his ship and to thaw out her engine. Just two days after leaving the post on his flight he arrived at his destination, though he felt the results of his walk for weeks.

Bondurant has since that time flown the entire northland of eastern Canada. He has been places where no other aviator has ventured before or since. On many a trip carrying geologists, food supplies and mining equipment, he has had to make his own maps. The best Government maps were not detailed enough. And on those flights Bondurant has drawn maps showing the landmarks in regions where ninety per cent of the country was water, though government maps had shown vast stretches of land. His resourcefulness and skill as a pilot and a woodsman have helped him out of many a tight corner.

It was on a flight from Seven Islands, on the north shore of the St. Lawrence River, to Fort Chimo, seven hundred miles to the north on Ungava Bay, that he came as near being stranded as he ever wants to be. He had with him a geologist and a mechanic, with enough food for one day, as they hoped to make their destination with only one overnight stop. Before they had gone many hours a storm came up. It seemed the best policy to come down to park on one of the innumerable lakes.

The Grand Falls, a mighty spectacle from the air.

Hour after hour they sat in their plane. Night came but the storm continued. The plane rode the waves on its pontoons. Came morning and no sign of a let-up. It was useless to go ashore, for timber did not exist there. They would find no better shelter than where they were. They managed a cold breakfast and waited. They passed the day and night.

In all they sat in their plane for 50 hours, unable to move much because all available space had been used to carry prospecting equipment. The food was all gone after two days. For awhile it looked as if another plane might be

(*Continued on page* 55)

Balloon Jumping is the Latest Sport in Germany

GERMAN thrill-seekers are going in for balloon hopping in a big way. First introduced in England, balloon hopping is a thoroughly venturesome sport.

The hopper sits in a boatswain's seat and hops over obstacles as shown in the photograph, which was taken

The crowd seems to be enjoying this exhibition as much as the jumper himself, who is having the thrill of his life hopping over the heads of the multitude.

at Templehof Field, near Berlin. There is not sufficient gas in the balloon to permit higher ascension than is required for the hops.

Novel Training Device Uses Moving Scenery

STUDENT airplane pilots of the future may learn to take-off, pilot and land a ship without leaving a stationary position on the ground. A device invented by George D. Beeson and recently tested at the Los Angeles municipal airport is designed to make such instruction practical.

The device is the result of two years of experimentation, and operates automatically under electrical and pneumatic power. The student pilot sits before a standard instrument board, containing blind flying instruments and standard controls.

During the take-off the scenery flashes before the student's eyes on a screen while he remains stationary. Everything is as realistic as possible, even the shadow of the plane's engine and wing struts appearing in the foreground. The roar of a miniature propeller with the blades flashing before the pilot's line of vision adds the last bit of realism. The horizon shifts in accordance with the manipulation of the controls as it does in real flight.

Following the test Beeson said he was confident that an average student could fly and even land a plane after two hours practice with this equipment.

JUNIOR ACTIVITIES
Edited by Paul W. Clough

EDDIE SCHNEIDER, 19, of New Jersey, former holder of the Junior Transcontinental record, has his Warner Cessna on the Ford Tour this year again. As we go to press Eddie is third place with the two Fords flown by Harry Russell who is first place and James H. Smart second place ahead of him. Eddie sure is making a good showing, even better than last year when he placed eighth but won the Great Lakes Trophy for the light planes.

Well, we all wish you all the good luck on the tour Eddie.

* * *

We recently heard from Victor Indrizzo, 20, of Brooklyn, N. Y. He has been doing quite a bit of flying at Roosevelt Field or at the Floyd Bennett Airport, Brooklyn. Here is his letter:

In the fall of 1929 *I had my first airplane ride at Roosevelt Field in a Fairchild cabin plane. Ever since I have been flying, and I started my dual instruction in May,* 1930. *I made my first solo flight in an Avro Avian which was once owned by Amelia Earhart. On Feb.* 8, 1931 *I received my Private Pilots' license and have flown solo the following ships: Waco, Swallow, Fleet, Barling "NB3," Avro Avian, Challenger, Commandaire and Robin. I am now making preparations for a trans-Atlantic hop to Berlin and Rome in a Ryan monoplane. I shall carry a radio and all Pioneer blind flying instruments.*

* * *

William Vanderminder, 16, of Hempstead, Long Island has been doing quite a bit of flying. He ought to be getting his Private Pilot's license quite soon. He is flying a Fairchild K.R.34.

* * *

Al Robbins, 19, of Roosevelt Field has been flying the C-W Juniors quite a bit at Roosevelt Field. He says he likes them quite well.

* * *

Bob Buck, 17, of Elizabeth, N. J., former holder of the Junior Transcontinental record, was at Roosevelt Field to welcome Wiley Post and Harold Gatty when they completed their round-the-world flight. He flew to Roosevelt Field from Westfield, N. J., in his Pitcairn Mailwing in the afternoon and returned after they arrived.

* * *

Arthur Romaine, 17, of Brooklyn, N. Y., recently returned from Richmond, Va., where he had flown in an O. X. Eaglerock to see some friends. Arthur said he flew out of some very small fields, just getting in and out of them, but the old Eaglerock did it O. K. This was Arthur's first real cross country flight. He now has 106 hours and hopes by April, when he will be 18, to have enough time for his Transport License.

* * *

Jake N. Fassett, 17-year-old private pilot, recently visited the Glider Section, Rhode Island Aviation League, at Providence. Jake attended the Cape Cod Glider School last summer and was elected a non-resident member of the Providence club last winter. The Glider Section's ship number 2—a Franklin Utility—was flown at the Rhode Island State Airport, and Jake got the opportunity to make several flights, the ship being towed to several hundred feet. After attending the Bowlus soaring school at Warwick, N. Y., Jake will join the Glider Section at Elmira for the Second National Soaring Contest.

* * *

A prospective junior pilot is William T. Sampson, 17, of Providence, R. I., who recently passed his physical for a transport pilot's rating. Bill is a junior member of the Glider Section, Rhode Island Aviation League. He has been doing quite a bit of gliding this spring.

Afraid that the rest of the club members would get ahead of him while he attended the C. M. T. C. at Fort Adams, Bill decided that he would take some time in an Aeronca. He got in over an hour's dual with Pilot Rege Schueler in the two-place Aeronca before having to leave for camp.

Autogiro and Plane Run a Tie Race

A BIRD biplane and an autogiro engaged in a novel race at Roosevelt Field, Long Island, to test the relative take-off and landing merits of the two machines. Each plane started from the same mark, taxied the same distance, took off at an angle of from seventy to eighty degrees, flew the same circuit, landed at the same angle, taxied equally and came to a stop at the same line. The race was declared a tie.

The photograph shows A. J. Neilson in the autogiro and William Marsalis in the biplane taking off together.

Practical Lessons in Flying

by JOHN B. RATHBUN

The First Lesson in Stunting

TODAY, being the first day in a series of advanced flying lessons which included aerobatics or "stunt" flying, found student Bob an early visitor to the airport. This part of the course promised more thrills and interesting experiences than the cross-country flights recently performed, and further, Bob could see no reason or probability of the bothersome mathematics entering into stunting.

Cross-country flights were, of course, the substantial meat of the course, while the aerial acrobatics could be considered in the light of a dessert that livened up the dull routine.

"Good morning, young'un," greeted flight instructor Ed Keith. "We have a fine morning to start out on the new section, and I hope that you are feeling well enough to take in all that I tell you. So far as the actual flying is concerned, there is not much more danger in stunting than in plain flying so long as you keep plenty of air between you and the ground with the ship in good condition. Your physical condition is the third important matter, which, as I take it, is up to par this morning."

"Never felt better in my life," replied Bob. "I'm all ears and eyes and rarin' to go any time that you will get off the soap box and start to work—and please leave out the crepe hanging until next time."

"Well, that being the case, follow me," ordered Ed as he started walking toward the ship. "I just wish to impress upon your mind that an extra careful examination of the ship and its equipment is the first step toward successful stunting, and when I say 'careful' I mean careful.

"There are a whole lot of things that we might allow to pass in ordinary straight flying, but just remember that the ship is subjected to unusual stress when stunting and that centrifugal force enters into the racket to an unusual degree when going through the stunts.

"We must take special precautions against being thrown out of the ship and at the same time protect the controls against loose packages or tools that might shift around and get us into trouble. And if you get thrown out you won't find the walking so good.

"Just look around the ship and see whether you can find anything loose—either outside or inside—anything that might shift around or fall out if the ship should stand on her nose or fly upside down. And next, examine the safety belts carefully for any weak spots or flaws in the connections and fittings.

"If there is ever a time when you want a trusty safety belt it is when you are stunting. Get the habit of being careful about such things, it is just as easy to get into a good habit as to be careless—and a whole lot safer."

Bob went over the ship carefully, inch by inch, but found nothing wrong. He apparently checked and double checked all of the principal members and groups, and then turned in his "O. K." to Ed.

A second later, however, he wished that he had not been so prompt with his report, for Ed frowned and then beckoned Bob to inspect the front cockpit.

"See that buckle," demanded Ed. "Do you think that you would wish to trust your life to that frayed belt with the rivets half pulled out? And right after I give you a special lecture on belts you go to work and O. K. one that is just about ready to fall to pieces under its own weight. Well, for your information I am going to tell you that I put this junk in just to see whether you would find it or not, and as usual, you didn't see it."

Bob blushed up under this fire and stammered, "They put in new belts yesterday—I saw them do it—and so I supposed that they were all right today. There isn't any use of inspecting what you know is there."

"That's just the trouble with you birds," roared Ed, now thoroughly angry. "You assume too much and guess too much. Just because the belts were new yesterday, doesn't prevent some other guy from sneaking over and borrowing them when your back is turned, does it? Anything might have happened to the ship since last night."

Bob took the defective belt over to the hangar to exchange it for a new one, and as he walked away, Ed called after him, "While you're over there, get a pair of goggles that fit tight. Don't take any chances of having the wind leak in and make your eyes water on this trip. If your eyes are full of tears as they were at the end of the last trip, this lesson isn't going to be of much benefit to you."

AFTER the new belt was installed and the goggles were fitted and approved, they climbed into the ship for the test. Bob had started the engine and warmed her up previous to this time, and they were all ready for the take-off when Ed gave the preliminary instructions.

"The first maneuver will be a dive. This will be followed by a zoom, and when we have perfected these two operations we will combine them and do a loop. If you have had a dive and zoom, you will see just how they fit into a loop. Climb her up to 4,000 feet, and then I'll take over the controls when you have leveled off."

The altitude was acquired without any unusual incidents and then Ed signalled his intentions of taking over the controls and starting the dive. He cut off the engine, pushed the stick forward and down went her nose into a steep dive.

Bob now noticed the wisdom of the advice that had recommended an inspection of his belt because he felt a strong tendency toward slipping through the belt as soon as the dive was in progress. If it had not been for the belt, he would have slipped forward out of his seat into the controls because the seat was now tilted forward at an angle of about 50 degrees. And the rate at which the wind was

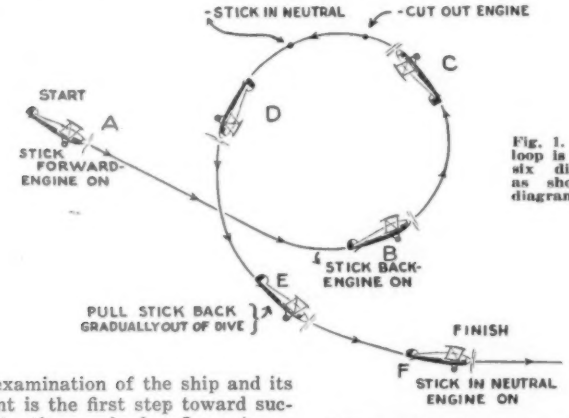


Fig. 1. The normal loop is completed in six distinct steps, as shown by the diagram at the left.

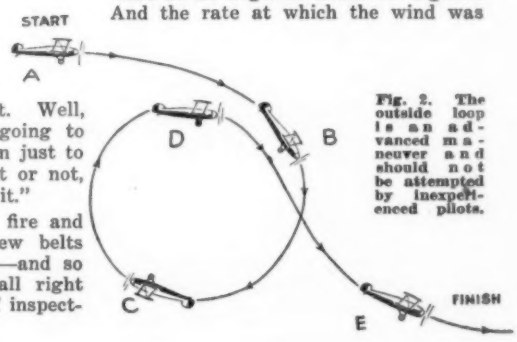


Fig. 2. The outside loop is an advanced maneuver and should not be attempted by inexperienced pilots.

pressing on his face reminded him of the precautions Ed had taken with his goggles. Even a small air leak at this speed would have meant tear blindness.

Struts and wires were singing in the blast of air when Ed slowly but firmly pulled the stick back toward him. The ship levelled off at an altitude of about 2,000 feet, the engine was cut in and they were again flying along the horizontal after losing 2,000 feet altitude. Now Ed's voice came over the phones:

"Did you notice that I didn't try to yank her out of the dive quickly, but pulled slowly back on the controls?

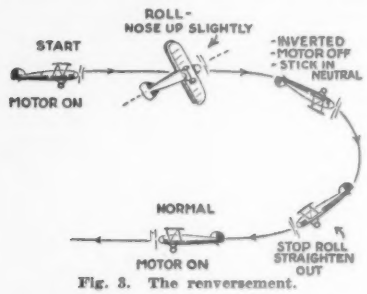


Fig. 3. The renversement.

Well, that is a good thing to remember because it is easy to strip a ship of everything that she has by whipping her out of a dive too quickly.

"At the high speed of a dive, which may easily be double the horizontal speed, the combination of centrifugal force and wind pressure at the end of the dive may remove the wings unless the ship is unusually sturdy. With a short turn out, say with a radius about five times the length of the ship, the stress on the wings may be easily ten times greater than the total weight of the ship and cargo.

"Now you climb back to the level and try the dive," said Ed, "but don't put her down too steep, and cut out the engine before you start the dive. Dive her down to 3,000 feet and then level off."

Bob pushed the stick forward as before, but as he had neglected to keep her pointed straight ahead, he was soon experiencing a swerve to the right due to a slight right rudder. This was corrected by Ed, and then came the levelling off which was done much too quickly. He had lost altitude so quickly that he was down below the 3,000 foot mark before he started work on the controls, and hence the quick pull on the stick that aroused a shriek from Ed. "Say, do you think this is a pursuit ship—or what? If you don't mind I had just as soon have you leave the wings on this crate, anyway until we land."

"NOW, we are ready for the zoom, the other half of the loop," said Ed. "Instead of coasting down a steep hill we are going to climb a steep one, and it is mighty important that we stop climbing before the ship stalls at the top of the hill. We can start a zoom from horizontal flight, but we get a snappier zoom if we start it at the bottom of a moderate dive, and as I told you before, don't make the turns so quick that you will unnecessarily stress the ship.

"Now watch me." Ed set her down on a moderate dive and then slowly pulled back on the stick until she was climbing almost vertically to the accompaniment of a groaning engine. Just before the stalling point was reached, Ed pushed the stick ahead and then into neutral as she leveled off.

"When you try this stunt," said Ed, "try it a long way off the ground and even then avoid stalling her. When the controls start to feel slack and ineffective, it is the symptom of an approaching stall, and the best thing for you to do is to avoid steep zooms until you have mastered the feel of the controls.

"The loop is one of the simplest and yet most effective of all the stunt maneuvers," continued Ed. "The first part of the loop is a zoom that is continued until the machine is on her back, and then the remainder of the loop is a dive in which the ship is brought out of its circular path into the horizontal. Given sufficient speed, and an understanding of the principles involved, there is no reason why the loop should not be mastered in a very short time.

"However, we must be sure that the ship is well trued up to begin with and that its construction is such as to guarantee good looping qualities. The controls on some ships allow of easy loops while in the case of others it is difficult for the novice to loop properly.

"The first requirement is speed which is best attained by a gradual power dive with the engine on. (See Fig. 1.). Then pull the stick back slowly at first and then more rapidly until it is back as far as it can go. When at the top of the loop the ship will be upside down and you will see the earth above you. Cut out the engine and shortly afterwards place the stick in neutral. With the nose pointed down, the stick should now be pulled back again, slowly at first and then more rapidly until finally she has been leveled off. Now for it."

Down went the nose along a rather steep path with the engine roaring. Back came the stick and the climb began. To Bob it seemed as though he were seated firmly on a stationary platform while the whole world revolved about him until at the top of the loop the world was upside down. The engine was cut out and then down along the curved diving path until they were again on a horizontal keel—but right side up.

It was not a terrifying experience and the whole thing took place so smoothly and naturally that Bob was charmed with the whole performance. Bob also noticed that the centrifugal force held him firmly on his seat, and at no time was there any strain on his safety belt nor any tendency toward throwing him out of the ship.

"You probably wonder why I made all that fuss about the safety belts before we started," remarked Ed over the phones. "Well, there is no need of a belt at all in a normal loop, but if anything should go wrong—such as a stall at the top of the loop when we are upside down, then the safety belts will do their stuff. We must go over the top of the loop fast enough to produce sufficient centrifugal force to hold us on our seats, but if the speed should fall off for any reason, then we would certainly be out of luck without something to hold us in the cockpits. Keep up the speed, that's the thing, except when we are coming out of the loop and are leveling off.

"Before starting out on the loop we must be sure that the machine is trued up and that there are no loose packages or tools lying around. In most cases it is best to make the loop against the wind although this is not absolutely necessary. Thirdly, the stick must be pulled straight back and not to one side, for if the ailerons are disturbed we will not come out of the loop square. And again, the rudder must be held in neutral, as in straightaway flight, for with right or left rudder on we may get into difficulties and at any rate the job will not be workmanlike.

"We must go into the loop at high speed, but at the same time we must avoid pulling the stick back so quickly that it will set up dangerous stresses in the wings. Pull back on the stick steadily and continuously until the ship starts walking up the side of the loop. Perhaps it is best to pull back a little slowly at the beginning and then faster toward the end so that the entry will be eased off without straining the wings.

"When we are coming out of the loop at the bottom, the ship should be pulled out of the downward dive even more cautiously because the speed is much higher and there is correspondingly greater stresses with a quick pull out.

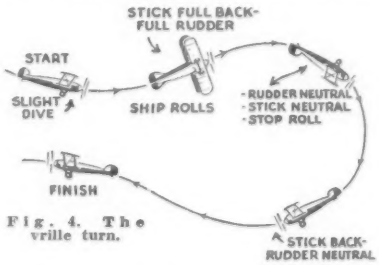


Fig. 4. The vrille turn.

"WE HAVE just finished an 'inside loop' or a safe and sane loop," said Ed, "where the danger is practically nothing at all. There is, however, the dangerous 'outside loop' that has been attempted only by a few experienced pilots and which should mean nothing at all for the student. (Fig. 2.)

"In the outside loop, we start at the top instead of the bottom, with the wheels inside and the wings outside of the circle. This certainly messes things all up, for now we have the centrifugal force tending to throw the pilot out

(*Continued on page* 56)

Good Posture Aids the Pilot

"RELAX and take it easy!"

So advises every good aviation instructor as his pupil tries to master the technique of the take-off, the turn and bank and the three-point landing.

"It might be a lot easier to 'relax and take it easy,' if the darn old seat were better adjusted," thinks the fledgling and he's right. Leading posture authorities of the country are turning their attention to this question of airplane seat adjustments for they recognize the relationship between flying fatigue and poor position.

Improper posture cramps the lungs, abdominal organs, legs and arms, the body is in a poor position to respond in case of emergency and poor posture often encourages tenseness, one of the great faults of the beginning flier.

Here are the principles of correct posture as outlined by authorities on the subject. , Sit with the back well against the back of the seat and with the weight resting mainly on the seat bones. Do not recline too much, slightly more than ninety degrees is enough and there should be support for the back at a point below the shoulder blades and at the top of the hips. In piloting a ship, there should be no pressure under the knees. The feet should be able to touch the floor and reach the rudder pedals without stretching or straining.

Correct posture is the most comfortable and the most relaxed. It is the most efficient and as every flier knows, it gives the proper view of the horizon and the relation of the nose of the plane to that important guiding line.

Auto Dealer Sells Planes

PLANES are now being sold by an automobile dealer in France. In the aircraft department eleven different types of planes, produced by five or six of the foremost aircraft manufacturers of France are offered for sale.

The planes range from the Farman 230 monoplane with a 40 Salmson engine to a Schrech 290 amphibian equipped with a 300 Lorraine engine. Prices vary from 33,200 francs ($1,301) to 276,800 francs ($11,000). The company will accord terms of payment similar to those granted for the sale of automobiles. Payments may be made over a period of twelve to eighteen months, with interest at 10%.

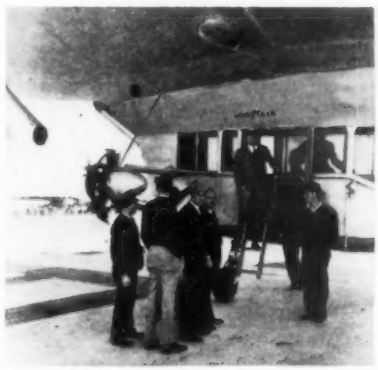
A certain amount of the list price of the airplanes is paid by the state from a fund set aside for this purpose. The amount varies with different planes and with the class of purchaser—individual, club or military pilot. In addition the state pays from this fund a certain amount for each hour of flying accomplished with the plane.

The sales company has a flying school where it will teach prospective buyers to fly or will furnish a pilot at $100 a month to prepare the purchaser to qualify for his license.

Baby Blimps Make Excellent "Rubberneck" Busses

AERIAL "rubberneck bus" service will be available this summer in several American tourist centers. The "busses" will be small air yachts, popularly known as "blimps," and will be operated by the Goodyear-Zeppelin Corp., which, besides building Americanized Zeppelins, maintains the largest private airship fleet in the world.

The Defender, flagship of the fleet, will be stationed in New York City, with headquarters in a brand new dock at Holmes Flying Field. The Puritan is scheduled to operate in Chicago, as a sort of overture for more extensive



The Volunteer takes on a group of passengers for a sight-seeing trip.

airship service during the coming World's Fair there. In Los Angeles, visitors will be able to look down on Sunny California from the cabin of the Volunteer. At Akron, Ohio, home and birthplace of the airships, the two remaining blimps, the Vigilant and Pilgrim, will be stationed.

The Defender, operating in New York, will be available for rather lengthy sight-seeing trips over the metropolis, permitting the dozen passengers carried each time to view the skyscrapers by looking down instead of up. In addition, the ship will make trips to Boston, Providence and other places not too distant.

But perhaps the most important service to be provided by the Defender will be in the interest of future transoceanic travel by airship. From the daily operation of the small dirigible over New York City, valuable data concerning air currents, weather and other things that are of importance to an airship skipper will be obtained. This will enable huge air liners of the future to venture over downtown New York with full knowledge of what conditions they will encounter.

Speaking of airship travel, it is probable that fast airship service between America and Europe will be available within two or three years, and that similar service over the Pacific to Hawaii and the Orient will be provided some time later.

During the recent visit of Dr. Hugo Eckener to America, it was said that German builders will proceed with the construction of a 7,000,000-cubic-foot helium airship just as soon as plans, originally drawn for a hydrogen craft, can be revised. This ship will be used on the proposed Transatlantic line. In addition to the new German Zeppelin, a similar vessel will be constructed in America; and there will be reciprocal use of hangars, service and traffic facilities.

The Goodyear-Zeppelin Corp., which has a sizable interest in both of the commercial lines, has worked out plans for air liners holding 7,500,000 cubic feet of helium lifting gas. The naval airships now being built are rated at 6,500,000 cubic feet.

The advent of Zeppelin airships as regular passenger carriers will introduce a new element into travel. You can start preparation for this era by becoming acquainted with the small air yachts that are operating in various parts of the country.

The Volunteer at the Glendale Airport. Trips over Southern California are part of the blimp's summer schedule.

What the Model Builders Are Doing

THERE is no abatement of interest in the model activities department. On the contrary, it grows by leaps and bounds, and the editor is literally swamped with pictures and descriptions of model planes built by readers of POPULAR AVIATION.

Let them come! The more the merrier, although it really is a difficult task to select the pictures and letters best suited for publication from the mass of material on hand.

Just remember, please, that photographs must be very clear in order to reproduce well, and that descriptions should be as accurate as possible.

LONDON stretches a hand across the sea once more with another letter from T. H. Gillett. He encloses a picture of a remarkably complete model of one of the early Wright planes. Concerning this photograph he says:

I made every bit of it myself except the man and parts of the engine,

F. A. Maier's Howard.

which were made by two friends of mine. It took four months to make, and is a model of one of the early Wright machines, made for a firm in England, and now reposes in a museum in your own city of Chicago somewhere!

WEST MEDFORD, Massachusetts, is represented this month by Gerald J. Morey, who encloses a photograph of an unusually well built Douglas Mail Plane model. The builder describes it as follows:

It is a six-foot model, which took 900 hours over a period of six months to construct. The ship has real airplane construction throughout, including the covering and doping. The cockpit is complete, having movable controls and pilot seat with safety belt. There is a dashboard with light and dummy paper instruments, also a pistol, first-aid kit, radiator control and throttle. A 110-volt A. C. motor is used to turn the propeller. The wings are orange and the body blue. It has been on display in Boston and has received very favorable comments.

A collection of airplane models built by readers of Popular Aviation.

Richard Kispert's Robin.

F. A. MAIER of Leonardo, New Jersey, is brief but to the point, sending a picture of his Howard Racer. He comments:

I am enclosing a picture of my flying scale model of the Howard Racer. I hope the picture is clear enough for publication. The model is one-eleventh the size of the actual plane and weighs less than one ounce.

LUCIUS L. MOSELY of Janesville, Wisconsin sent us this picture of a Ryan Foursome which he built. The plane is an exact scale model all but the pants on the wheels which were added to improve the looks, but they do not help the flying qualities of the model, acording to the builder.

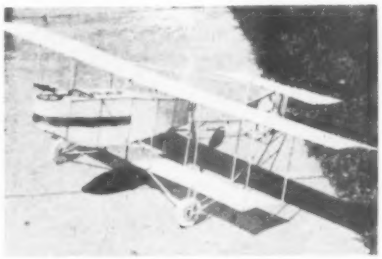
Lucius Mosely's Ryan.

RICHARD KISPERT of Cincinnati, Ohio, makes a bid for modern rather than war-time models. "Up-to-date planes such as Wacos, Travelairs, Stearmans or even little Heath or Buhl 'Bull Pups' would make better flying models and much better looking models than the war-time planes." Concerning photographs of his models he says:

The picture shows my non-flying scale Curtiss Robin. This plane had miniature controls, upholstered seats and cabin, venturi tube, etc. It took two prizes at the Cincinnati aircraft show about a year ago.

GORDON A. NESBIT of Rensselaer, Indiana, evidently has gone in for model building in a big way, for he refers to his "fleet." Says he:

I am enclosing a photograph of one of the model airplanes of my fleet. It is a Farman war-time biplane. I drew the plans myself. It has a 30" wingspread and is a flying model.



Gordon A. Nesbitt's Farman.

ANTON TRYKOSKI of Chicago writes that he has a "yen" for war models. He sent pictures of four models which unfortunately are not suited to reproduction. "My next model will be a Roland D-II pursuit plane used by Germany," Anton declares.

Engaged in building a Fleet airplane model to order of the Connecticut Fleet representative, Art Ramsey of Chicago send us some pictures of the model in an unfinished condition and a description of the materials used. It is a built up engineering job. Brass tubing and wire figure largely in the construction which follows the Fleet in all details.

(*Continued on page* 53)

T. H. Gillett's Wright.

Gerald J. Morey's Douglas.

How to Build the Bumble Bus

A tricky little twin pusher specially designed for Popular Aviation

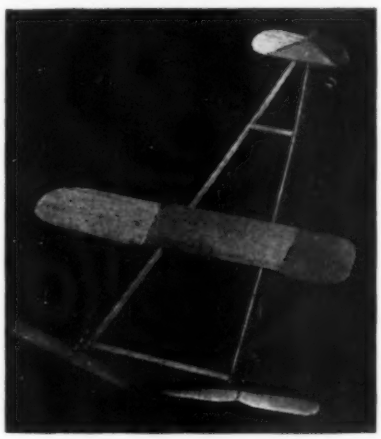
by POP STICK

THIS little plane should not be held responsible for its actions in flight. It may zoom and loop the loop, fly straight or climb fast and then dive. It's tricky, but a lot of fun. Besides, it is very simple and easy to build—can be constructed in two hours.

The drawing is so complete that no effort will be made to offer detailed written instructions. The finished plane is shown in the picture, and it should not be difficult for anyone to built it from the abbreviated data given.

The frame is braced with balsa cross members and securely cemented. The thrust-bearings, bent from piano wire, should be tied and cemented firmly.

The wing is flat and the ends are upturned, giving a small dihedral on each side. Cement directly to the frame. The propellers are bent from thin holly or balsa wood and dried over a candle flame. One is bent left-hand and one right-hand. Hard, thin wood is preferable for the propellers.

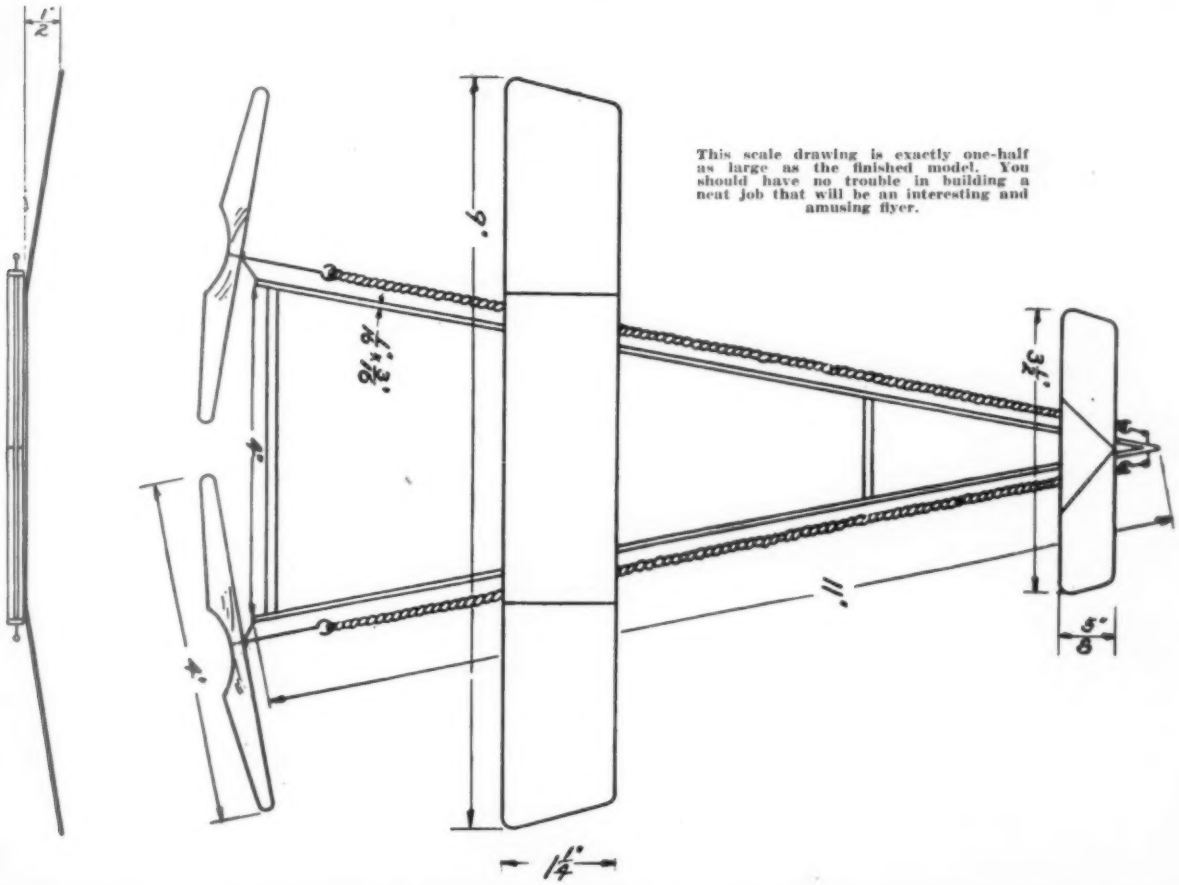


The completed model.

The locations of the stabilizer and wing are correct on the drawing and will balance the model. The stabilizer is cut along the angular line and set upward one quarter of an inch to give an angle of incidence. Cement the complete stabilizer flat on the frame.

Abbreviated Building Instruction and List of Materials

1—Stabilizer—Balsa, 1/32".
2—Wing—Balsa, 1/32".
3—Frame—Balsa, 1/8"x1/8".
4—Propellers—Holly or Balsa, 1/32".
5—Wire Hangers, .016" diam.
6—Wire Shafts, .016" diam.
7—Small bands for motor.
8—Yoke—Piano wire, .016.
9—"S" Hooks—Piano wire, .016.
10—Cement, small can.



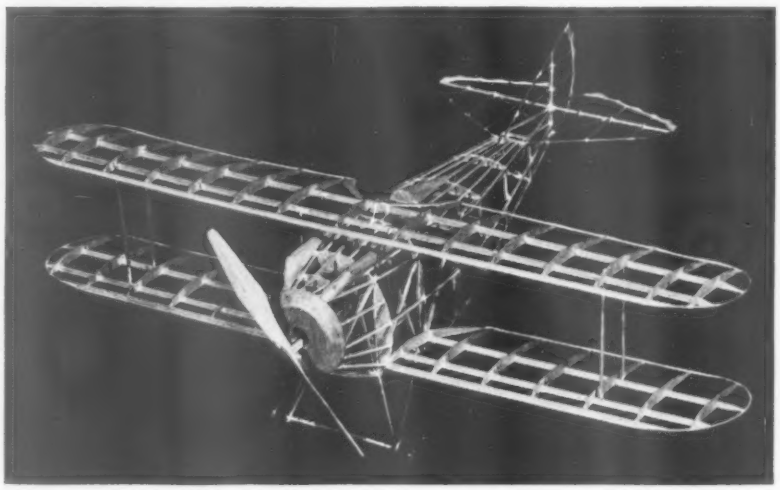
This scale drawing is exactly one-half as large as the finished model. You should have no trouble in building a neat job that will be an interesting and amusing flyer.

MODEL DEPARTMENT

How to Build *The* S. P. A. D 13

by

JOSEPH S. OTT



A view of the finished skeleton.

THE model offered this month is one of the famous French fighting planes used during the World War. The American ace, Captain Edd e Rickenbacker, brought down 25 enemy planes with this type of single seat pursuit.

Two photographs of the model are shown, one in skeleton, and the other completely covered. Because of the view taken of the skeleton model, the body appears to be rather large; however, the scale has been copied accurately, and after the model is completely covered, this apparent thickness will not be as noticeable as on the photograph.

In both photographs, only one set of struts is shown. It is not necessary to use more than one pair on each side for a flying model. The added weight of the additional struts and resistance will be of no benefit, with the exception of making the model appear more true to scale. The drawing of the front and side views shows the arrangement just as built on the large plane, and this may be followed out by those desiring to make a true to scale model in appearances and arrangement.

The wing has been set back farther than called for, through reduction of the scale, and the wheels have been moved a trifle forward. This will help to balance the model forward in flight. The wings are stationary, and the motor stick is 12" long, having its center of gravity approximately in the middle of the wings. The wheels will balance the remaining part of the tail, and the model should fly just as arranged in the plans; however, if it tends to be a little tail heavy, a small weight added to the nose will compensate.

Two large, full size wings are used, and because of the area, a small angle of incidence is necessary—this should not be over ⅛ of an inch. One-sixteenth of an inch was used on the test model and was found to be sufficient; however, the exact amount will vary, depending upon the weight of the model.

The completed 30" model, built for this article, was just a trifle under 2 ounces. It could have been lighter, but it is not necessary to make it too light, as the model tends to become flimsy and the wings will warp out of shape too easily.

The photo of the skeleton model does not show the nose ribs in place. After the model was partly covered, it was discovered that the sagging between the ribs was quite prominent. Parts of the covering were then removed and the nose ribs added. These were shown on the drawing and should be put in place to show the entering edge of the wing section.

Materials

No. 1. Body—10 pcs.—3/32"x3/32"x 30"—Balsa.
No. 2. Landing g e a r—3/32"x¼"—hard Balsa.
No. 3. Tail—2 pcs.—1/16"x¼"x15" bamboo and 1/16"x¼" hard Balsa.
No. 4. Wheels—for 24" model use, wheels 1⅞" diameter; for 30" model use, wheels 2¼"diameter. Either celluloid or built up balsa.
No. 5. Struts—2 pcs.—1/16"x¼"x15" —Bamboo.
No. 6. Fittings, piano wire—diam. .029.
No. 7. Propeller—⅝"x1"x10"—Balsa.
No. 8. Motor stick—3/16"x5/16"x12" long—Hard Balsa.
No. 9. Rubber motor—10 ft.—⅛" 30 gauge.
No. 10. Spars—4 pcs.—⅛"x⅛"x30".
No. 11. Trailing edge—3 pcs.—1/16"x ¼"x30"—Balsa.
No. 12. Entering edge—2 pcs.—⅛"x ⅛"—Balsa.
No. 13. Tissue—3 sheets—18"x24"—Super Fine.
No. 14. Rib stock—Balsa 1/32" or 1/16" sheet stock, approx. 2x 30".
No. 15. Lacquer—Black g l o s s y for struts.
No. 16. Cement—½ oz. unit.
No. 17. Banana liquid—Small can.
No. 18. Lacquer—Red glossy and aluminum for propeller.
No. 19. Washers—3 ea.
No. 20. Allied war emblems.

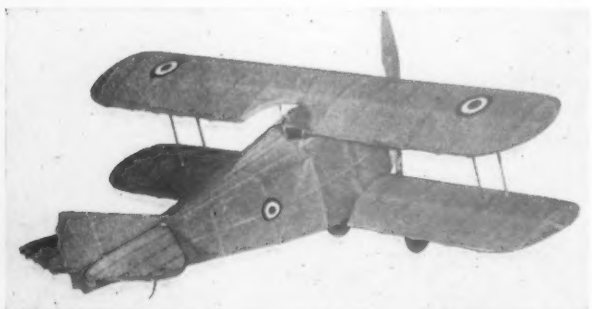
Abbreviated Building Instructions

No. 1. Body sides.
No. 2. Assemble sides.
No. 3. Nose block.
No. 4. Cowling top, sides and bottom
No. 5. Landing gear.
No. 6. Tail skid.
No. 7. Rudder and stabilizer.
No. 8. Ribs.
No. 9. Nose ribs.
No. 10. Assemble wings on body—Center struts.
No. 11. Outer struts on each side.
No. 12. Inner struts, if desired.
No. 13. Motor stick.
No. 14. Propeller.
No. 15. Clips—motor stick.
No. 16. Thrust bearing and shaft.
No. 17. Covering.
No. 18. Decorating—emblems.
No. 19. Flying.

Detailed Instructions

Body—Nos. 1 and 2

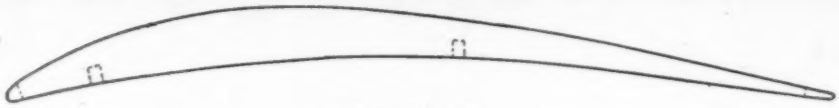
THIS is the third month we have shown plans drawn to scale instead of putting dimensions directly on the parts. The general scheme and arrangement of the design is clearly illustrated, and the size of the model may vary to suit the builder. The scale of the wing span on the drawing is 6", and this may be multiplied, increasing the span to various sizes, for example, 12", 18", 24", 30" and 36" wing span. Such an arrangement gives an unlim-



The finished model is a neat appearing plane with excellent flying qualities.

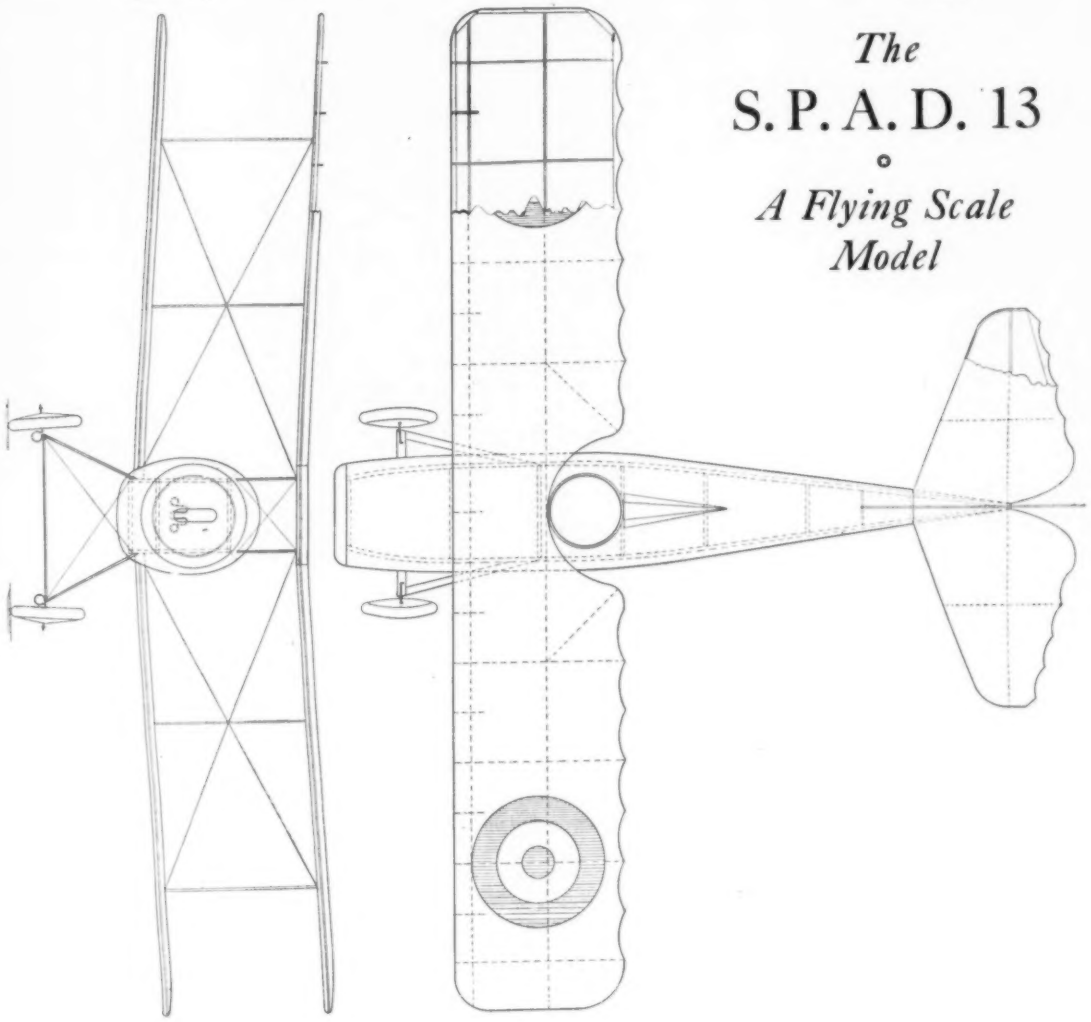
The results of the Nieuport Model Contest (July issue) will be found in the Airy Chat with the Editor on page 6 of this issue.

Actual size rib for the 30" model.

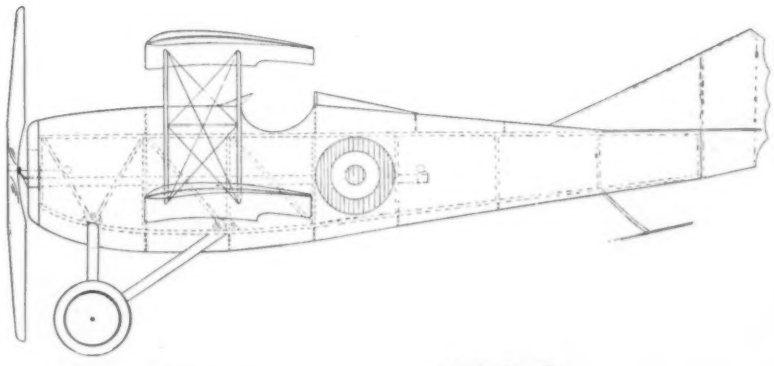


The S. P. A. D. 13

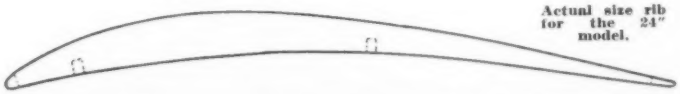
A Flying Scale Model



These plans are the exact size of a 6-inch model. For a 30-inch model, multiply all measurements shown here by five. This can be done most easily by using dividers to measure the dimensions.



Actual size rib for the 24" model.



ited amount of sizes for the model builders to choose from.

After having decided upon the size, a full size drawing should be made of the body side to scale, as illustrated on the accompanying plans. The balsa pieces should then be laid down and cemented in place and allowed to dry. Make two parts, one for the left and one for the right side of the body. If wax paper is obtainable, this may be used between the two sides, so that they will not stick together.

After the two sides have been assembled and are dry, the top and bottom members may be added. The top side of the fuselage is flat and should be worked with the flat side resting on the table, being held in an upright position and at right angles to the table until dry.

Nose Block—No. 3

As the radiator on the Spad is very large and flat, the nose block will appear to be rather large and bulky in appearance for a flying model. However, as the original is to be copied as much as possible, it is best to make a part that represents the radiator as specified.

The diameter for a 30″ model is approximately 3″. This should be rounded off, as illustrated, and given two or three coats of dope and sanded down. After having cut out the part that receives the motor stick, the nose block should be cemented in place on the body. Be careful to align the hole correctly, so that it is not off-center.

Cowling Top, Sides and Bottom—No. 4

The front of the plane is completely round and gradually tapers off to an egg shape, having the deep side through the depth of the body. Cowling made of thin 1/32″ sheet balsa is used for all parts that help to round off the fuselage; these are noted by the small dotted lines above and below the fuselage longerons. The thickest part may be checked from the top and side views of the drawing. The remaining parts to the front and rear should be tapered slightly so that the body will have an even outline.

Landing Gear—No. 5

The landing gear is made entirely of balsa. Balsa is used in this case because the landing gear is very short and stubby, and plenty of strength can be secured by the use of hard balsa. Then, again, the large wing area of the model does not allow the model to land very fast. The landing gear struts should be streamlined on all the parts used. The approximate size of the struts is ⅛x5/16″, sanded down to a streamline form.

Tail Skid—No. 6

The tail skid is a small piece of bamboo projecting into an added part on the lower strut of the fuselage cross member. This is held in place by cementing. A slight curve on the lower end of the strut is desired so that the model does not catch on any object when at rest.

Rudder and Stabilizer—No. 7

The rudder and stabilizer illustrated on the drawing show a single surface section. However, the original model was built using a cambered surface. The cambered surface was found to be very strong, but a little more work was necessary because of the added parts above and below the spars. This necessitated the addition of three ribs instead of one, as illustrated. The rear end of both the rudder and stabilizer is made of a piece of thin balsa 1/16x ¼″ scalloped.

Ribs—No. 8

The ribs for this model are very thin, and care must be taken that the cutout section for the spars does not leave the ribs flimsy, causing them to break before they are mounted in place. The upper and lower ribs are the same for both wings.

Nose Ribs—No. 9

The nose ribs are placed between each full length rib, having the same shape as the large rib, being cut off approximately ¾ of an inch from the entering edge.

Assemble Wings on Body—Center Struts—No. 10

Only a slight dihedral is used in this model; a larger dihedral will make the model deviate too much from the original design. The only reason that the slight amount used was found to be necessary was because the first test model did not have any in the wings, and it had a tendency to side slip.

The complete wings, upper and lower, may be assembled in one piece and then the dihedral may be put in by cutting the spars just enough so that they will bend upward sufficient to put in the correct amount. The lower wing may be cut in two pieces, eliminating the undesired part of the center section. If the ribs for the lower wings do not match, a new one should be put in place at the side of the body.

The top wing is placed in position over the fuselage and held in place by blocking up. The center section struts are made of thin pieces of bamboo 1/16 x⅛″, rounded off on all corners. When assembling the wing at this stage, be sure and include a slight amount of incidence. The stabilizers must be in a straight forward flying position, and the entering edge of the wing should be raised approximately 1/16 to ⅛″ higher than the trailing edge.

Outer Struts on Each Side—No. 11

The outer struts are made of bamboo 1/16x⅛″ and should be cemented to the top wing, allowing them to project downward longer than necessary, until the lower wing is put in place. The lower wing should be attached to the fuselage with pins, aligned and then cemented in position.

Inner Struts—No. 12

If an exact copy is desired, the inner struts should be arranged as shown on the drawings. In reality, the inner struts are four small struts braced at the middle with an additional strut to the rear strut, similar to a letter H.

Motor Stick—No. 13

The motor stick may be made of hard balsa or pine, depending upon the material on hand, or such material that has been found to be most suited by the model builder for this particular part. The size of this part is approximately ⅛x¼″ for pine and 3/16x5/16″ for balsa.

Propeller—No. 14

The landing gear is built to take a 10″ propeller. If a 11 or 12″ is desired, it is necessary to have the landing gear a little bit longer to compensate for the added length.

Clips—Motor Stick—No. 15

A piano wire clip to fit around the motor stick should be bent to the shape illustrated in the front view of the drawing. Cement this clip on the inside of the nose block, then add a small piece of thin balsa over and against the clip to help keep it in place. This method insures a strong and rigid vice-like grip over the clip and prevents it from being pushed out of place when the propeller strikes an object.

The motor stick is held at the rear, directly below the cockpit by cutting out of a thin piece of balsa, a hole sufficiently large to receive the motor stick, simply allowing it to rest in place. Another method to hold the stick in place at the rear would be to make a large clip that will reach from each side of the fuselage, having a clip arrangement wherein the motor stick can be pushed into this part at the center of the fuselage.

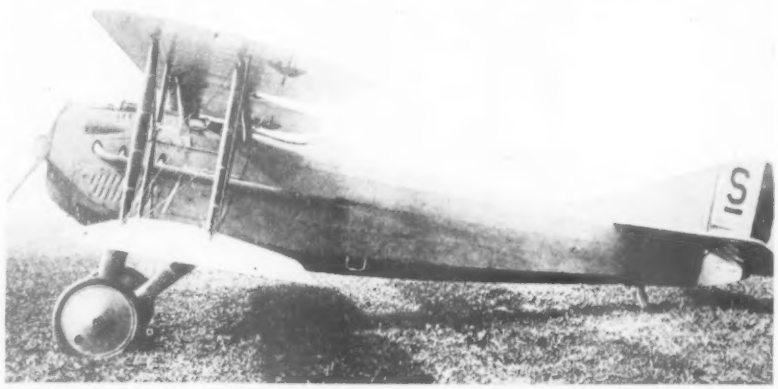
Thrust Bearing and Shaft—No. 16

Thrust bearings are always a sort of a problem. It seems that the right kind and size are seldom at hand. The simplest and best way to make one is to use a small nail, flattening out the full length slightly, but at the point that will be drilled, flattened more than the remaining part.

The shaft used for the propeller is made of piano wire .029 diameter. Bend to the shape as illustrated in the side view of the drawing and allow a length of approximately 1½″ from the end of the propeller to the hook. If the propeller shaft is made short and stubby, the propeller tends to wabble and does not have as much efficiency as is obtainable with a longer shaft.

Covering—No. 17

Japanese Super Fine tissue is used to cover the model. Some model builders prefer covering all the parts separately and then cementing them to the body; others again, prefer assembling the complete model and then covering the



The famous Spad 13 from which these plans were taken.

parts after the complete unit is lined up true. There is not much choice in either method.

It is always best to do the things the way one feels they can do them in the shortest and simplest way. In some cases, certain rules are given because of the best methods that have been obtained by making similar units. In such cases it is best to follow the specified methods.

Decorating and Emblems—No. 18

The allied war circles are used, and the red, white and blue tail stripes are in an upright position. The Spads that were used by the American Division had khaki colored bodies and natural colored wings. Of course, this was not true of all of them, but those that looked the best had a color arrangement similar to this.

Flying—No. 19

Because of the possibilities of damage to a scale model, it is advisable to employ dihedral. Inherent stability is desired of all models, because they do not have the ability to correct their path of flight. The utmost caution must be employed in trying out a model the first time; the approximate center of gravity must be located and the necessary weight added to the nose to bring about the meeting point of the center of gravity and the center of pressure.

After this is secured, it may be advisable to glide the model minus the motor stick, then adding the motor stick and gliding again and making adjustments for flight. When the model is ready to be tried, it is advisable to have a boy friend help in adjusting the proper balance, one boy launching it and the other boy catching it—first being very close together and gradually widening the distance until the model glides normally.

What the Model Builders Are Doing

(*Continued from page* 48)

Another Art, this one Art Boese of Clinton, Oklahoma, send us pictures of a scale model he built, but the photographs are too small in perspective to show up well in the magazine. Boese is a real enthusiast, working under some severe handicaps but determined to carve his career in the field of aviation.

Lane Duff and Richard Kirkton of Canon City, Colorado, collaborate in letter writing as well as in building model airplanes. They send a picture of their Hawk P-2. "It is made of balsa wood throughout," the letter says, "except for the wheels, which are aluminum. We had controls in it but took them out to fly the plane."

Chester Sutton, of Mullens, West Virginia, encloses an attractive snapshot of a hangar and fleet of miniature planes, but the picture is so tiny there is no chance of publishing it. A Hawk, Fairchild, SE-5 and a Primary Glider are shown.

Another set of pictures too small for our use is sent by Fred W. Locke, Jr., of Forest Hills Gardens, N. Y. The photos show his Fokker triplane which, the builder says, "has been very successful."

Ralph Pritchard of Mount Morris, New York, submits a photograph of a Great Lakes Sport trainer which he built. It is finished in high lacquer and seems very attractive. The plane is a 24" exact scale model and has working controls.

Mills Hammet of Tulsa, Oklahoma, is president of the Marthon Aero Club of that city. He sends us a very small picture of his C-W Coupe. "This model has a fuselage length of 14", he writes, "and a wing span of 24". This plane averaged around 75 seconds in six flights."

Stockton Ferris, Jr., of Brooklyn, New York, submits a picture of four model planes. "The models in the picture," he explains, "are ones of a series I started on a 1/50 scale. They are the Baby Nieuport, Albatross D. III, Fokker D. VII and S. E. 5. These have all the rigging, hollow cockpits, and pilots. The Albatross has a built-up engine and movable controls, operated from a stick and rudder bar in the fuselage, which is completely hollow." Unfortunately the detail in the picture was too fine to be reproduced.

Duncan Morrison of Abingdon, Illinois, tells us what is wrong with the pictures he sent us. "Out of focus" is the reason why they cannot be used. The pictures are very interesting, however, showing a flight of seven Nieuports "on the line." This model builder writes that he has started on a flight of seven S. E. 5s which he hopes to finish soon.

John Moyer of Wilkes Barre, Pennsylvania, offered us a picture of his Curtiss Falcon model which he built in 36 hours. The plane has a 17-inch wing spread and a length of 11½ inches. Unfortunately, the photo is not clear enough for our use.

Once more we repeat the warning that photographs must be very clear and distinct in order to be accepted for reproduction in the magazine. While size is not of utmost importance, it will not do to have your pictures too tiny.

Photographs for magazine use have to meet a number of peculiar requirements which it is not posible to explain in detail, so please don't be disappointed if you send us what you think is a good picture and it fails to appear. Also, please be patient. With the large number of photos received every day for this department, it may be necessary to hold your offering rather a long while.

Unique Propeller Shroud

(*Continued from page* 12)

In studying the problem of increasing propeller efficiency, the inventor of the new device first considered the idea of an adjustable propeller, the blades of which might be changed in pitch at the will of the pilot. He soon found, however, that such a propeller could not be built with sufficient strength to do its work and still remain light enough in weight or efficient enough. As a result, he devoted his time to developing the present device which approaches the same problem from a different angle.

Due to the low mean propeller efficiency in the past, the trend has steadily been towards the building of more and more power in the motor with the obvious result of a larger and larger airplane. With a motor of one hundred indicated horsepower and with an allowance of ten horsepower for motor friction, a propeller that is only fifty per cent efficient utilizes but forty-five horsepower.

The "shroud" eliminates much of this waste by greatly increasing the efficiency of the propeller. And by adding greatly to the pull, it not only increases the all-around efficiency of an airplane but it enables a plane to be lifted out of a comparatively small field with little trouble.

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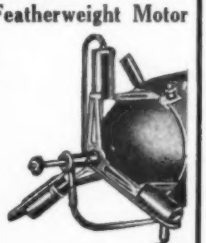

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WOMEN'S ACTIVITIES
Edited by Lady Mary Heath

July 10, 1931.

IT IS tragic for all of us who admire our fellow member of the Women's International Aeronautical Association that Miss Ruth Nichols, on her gallant effort to cross the Atlantic should overshoot the field at St. Johns, N. B., and crash her machine. We are doubly sorry to hear too that she will be laid up for six weeks. I hope and trust that this accident may keep our very plucky Ruth from any further attempt to span the North Atlantic. At the present time none of us has the experience or knowledge necessary for such a flight, and furthermore Miss Nichols' life is far too valuable to American Aviation to risk in such a flight.

Lady Mary Heath.

* * *

The death near London on June 19th of Miss Sicele O'Brien will touch all of us who admired her for her magnificent work and pluck in keeping up her flying after she lost a leg in a flying accident in 1928. Miss O'Brien had done considerable work for the Air League of the British Empire and was one of the two women who formed the Aviation Ambulance Association of England.

* * *

Mrs. Amelia Earhart Putnam has recently returned from her transcontinental Autogiro flight. She has had just over 150 flying hours in it. She has also written a fine chapter in "Wings Over the World" on the influence which women have on aviation. It is officially stated that Mrs. Putnam was reprimanded for her accident at Abilene in June.

* * *

Miss Edna May Cooper of Los Angeles who last year put up an endurance flight in that town with Miss Bobbie Trout has been sued for $1,499 by Mr. Joseph Martin who spent $30,000 on their flight. Miss Cooper denies this personal debt.

* * *

The husband of that fine aviatrix, Mrs. Louise Thaden, has just accepted the management of the Fokker Aircraft factories at Teterboro as Chief Engineer.

* * *

Col. and Mrs. Lindbergh have tested out their new Lockheed and are ready for their flight to the Far East. On July the 10th they both took their Radio Tests for receiving and transmitting radio messages. The license they received requires transmission of at least 15 words per minute.

Miss Amy Johnson has prepared for a solo trip across Europe and Asia to Tokyo and arrangements for her flight are being made by the Soviet authorities.

* * *

Miss Betty Robinson, American Women's Olympic Sprint Champion, was critically injured in an airplane accident at Chicago on June 28th, but she will recover. She holds the world's record for 60 yds. in seven seconds and the 70 yds. in 7.9 seconds.

* * *

The Vicomtesse de Sibour, a fine aviatrix, started with her husband from Le Bourget, Paris, on June 15th on an air tour of Europe and Asia. They are going to European Russia, Siberia, China and Japan.

* * *

Miss Laura Ingalls of St. Louis is headed towards New York in a Lockheed Vega monoplane. She, too, intends to tackle the North Atlantic. Miss Ingalls has held the women's world's record for loops and rolls.

* * *

A group of New Haven, Conn., women have organized a local unit of the Women's National Aeronautical Association. Mrs. Charles L. Morris, wife of the state aviation commissioner, presided.

* * *

After a severe automobile accident a year ago Miss Marjorie Crawford of Los Angeles has started flying again and has signed up for the Aerial Memorial Day Services to drop flowers on the graves of World War heroes.

* * *

Mrs. Mae Haizlip has entered the National Air Tour with a Buhl Pup after her fine effort in attempting a world's altitude record in that machine. The record stands at 26,712 feet and is held by a German pilot. The American mark is 24,074 feet. Mrs. Haizlip has therefore taken the women's world record for light machines for her flight of just under 22,000 feet.

* * *

Mrs. May Malcolm of Oakland, California, is the oldest aviatrix in America, being past 60. The Duchess of Bedford who is 65 is, I believe, the oldest woman pilot in the world.

* * *

Miss Florence Klingensmith of Fargo, N. D., has established a record for looping for women pilots. She looped 1,078 times in the air over Minneapolis and beat Mille Bolland of France who had 900 odd loops to her credit.

* * *

A strenuous effort is being made by the Cincinnati Girls' Glider Club to get its secondary trainer ready to fly this week. It is being assembled in the basement of Mrs. Walter Weifelman's house. She is the president of the Club.

The advertisements I have seen of Mrs. Blanche Miller's 1,000 foot parachute drop reminds me that the limit, 32,000 feet, was performed by Miss Helen Berger of California in 1926 and another record of nearly 300 descents has been made by Mme. Triebner of Germany.

* * *

Mrs. Marcellies (Miss Francis Harrell) gave two flying exhibitions at Rheinbeck, New York in the early part of July. Her first stunting was done in a Waco taperwing but unfortunately Mr. Van Lien, a transport pilot belonging to Curtiss Wright Services, landed it afterwards on a couple of gasoline barrels causing $1,000 worth of damage to it. Her second stunting exhibition was therefore given in a Fledgling.

* * *

A splendid flying meet of 18 flying boats and amphibians started on July the 11th from Seawanhaka Yacht Club, Long Island. It was arranged by the Aviation Country Club at Hicksville. Among women present on this tour are Mrs. James B. Taylor with her husband and Miss Eleanor Hoyt who is accompanied by her pilot fiancé, Mr. Felix Du Pont. Not more than 200 miles a day will be done on the cruise but a series of golf and other games will be played. At a recent Aviation Country Club meet at Hicksville, Betty Hyler Gillies took second place in the spot landing contest.

* * *

Upholstering to match your flying clothes is now being fitted in machines. Mrs. Harriett Barrett of Oklahoma is having an Inland Sport done up in red leather to match her red helmet and coat.

* * *

The California Branch of the 99 Club held the second Women's Air Race Meet at Clover Field, Santa Monica, on Sunday, June 23rd. The proceeds went towards prizes.

* * *

Miss Lauretta Schimmoler, manager of the Bucyrus Airport, Ohio, has just been made Governor of the middle Eastern section of the "99" Club.

* * *

Mr. and Mrs. Charles Healy Day have reached Syria on their round the world flight in the home-built machine. They are both pilots, and the rudder bars are set at different distances from the seat to accommodate them.

* * *

Mrs. de Beauvoir Stocks, a real veteran who learned to fly in 1912 at Hendon, has just joined up again and signed for a "Refresher" Course at Reading, England.

* * *

On July the 12th there are 466 Women pilots (Private), 55 Women pilots (Limited Commercial), 37 Women pilots (Transport), 5 Women Mechanics, 2 Women Non Commercial Glider pilots, 1 Woman Commercial Glider Pilot.

* * *

It will probably interest all people arranging air meets as well as those

women wishing to enter them to know that on June 22nd I received the following letter from Mr. Gilbert C. Budwig, Director of Air Regulations, Dept. of Commerce, Aeronautics Branch, Washington, D. C.

June 22nd, 1931.

Dear Madam:

I am taking the liberty of replying to your letter of June 16th due to Mr. Young's absence from the city.

We have placed no limitation upon Women whatever in the Air Commerce Regulations. As far as we are concerned in air races, or otherwise, women are in the same category as men.

The ruling you refer to is apparently a local one or perhaps a ruling instigated by the National Aeronautic Association, although we are not all certain that it had jurisdiction over this race or that it had such a ruling.

On receipt of this I wrote at once to the N. A. A. in Washington although I had gone very carefully through the rules and could find nothing against women in races nor in the rules of the Federation Aeronautique Internationale which encourages women to enter all races. In reply I had this wire, which was afterwards confirmed by letter.

"Admissibility of women pilots usually left to the discretion of the local contest committee."

National Aeronautical Association.
Signed Enyart.

These letters were the result of a protest which I put in over a meet in New York State run by the American Legion. My entry was accepted by the man in charge. After I had hired a machine and gone up to the meet, not alone was my entry refused for any of the races but the four other women I had persuaded to go on the invitation of the American Legion were also refused.

It is therefore of great happiness to me personally that on production of the Dept. of Commerce's letter at the American Legion meet on Saturday, July 11th at Valley Stream, Long Island, Mrs. Opal Kunz, who had her Travelair Mystery Ship, was allowed to enter the free for all race. She took second place to Pete Brooks who won in his Lockheed Air Express.

A Lightplane Record

(*Continued from page* 23)

11,000 miles was 10 days 22 hours, or forty hours better than the "Southern Cross," which is a three-engined craft employing ten times the power of Scott's light 'plane.

The only alteration from standard, in the plane used for the flight was the fitting of extra fuel tankage in the front cockpit. Altogether the tanks held 101 gallons of fuel, sufficient for a flight without refuelling of more than 1,500 miles. In every other detail the craft was exactly similar to the light biplanes employed by private owners and club members in all parts of the world.

Adventures in Canada

(*Continued from page* 43)

lost in the cause of the mineral exploration of Canada. But with the first sign of a let-up in the storm Bondurant made the plane rise from that lake and did not set her down again till Fort Chimo appeared below.

Like an explorer of old, he has come down to Indian settlements where no plane has ever been before. As in the days of long ago, when the Indians feared the big ships the palefaces came in, so they at first were scared of the "big bee" in which the white man came out of the sky. Bondurant tells the story of his arrival at one post in the hinterland of Northern Quebec.

As he was coming down he was surprised to see about a hundred Indians loping for the bush as fast as they could go, while one lone man advanced to the shore. Down came the plane, and just at the bush line the Indians stopped. Bondurant and his party stepped out, waded ashore, were welcomed by the only white man at this fur post, and then were surrounded by Indians of all sizes and ages.

They wanted to shake hands, and Bondurant was kept busy shaking hands all day, each Indian coming back several times to shake hands again. They had never seen a plane before. When "Bon" started to take pictures with his small camera, there was no holding the natives. Nothing less than that he should take picture after picture, though after using up three rolls of film, the camera was empty, while the shutter continued to snap at braves and papooses while daylight lasted.

When Indians told him at Seven Islands that there was inland a waterfall from which the roar could be heard fifty miles distant when travelling by canoe, Bondurant was somewhat skeptical. But the cataract was on his way to Fort Chimo, and he decided to investigate on one trip. He heard the falls twenty miles away above the roar of his 400 horse power engine. At ten miles distance the air became bumpy. A heavy mist screen arose. Down went the plane, into the mist. Up she bounded a hundred feet. The air was decidedly bumpy. The water fall below over a cliff 302 feet high, and above and below rapids spread for many miles.

With his small camera Bondurant began to take pictures of the falls and the rapids, his plane as low as was safe, riding the air like a ship in a storm. Later Bondurant learned this bit of dangerous flying had not been in vain. His were the first aerial pictures to have been taken of Grand Falls on the Hamilton River in Labrador, estimated to have more hydro-electric energy than Niagara.

In preference to flying the air mail routes between cities, which Bondurant does from time to time, he likes the unknown northland. "It is more dangerous," he will tell you, "but I like it better."

Army Pilot Knocked Out

(*Continued from page* 15)

lost about 3,000 feet of altitude over Chicago and was heading toward Lake Michigan.

It was impossible for him to reach the rudder bar to effect a change in the direction of the plane. He attempted to remove Lieut. Coates from the seat, but the latter's feet were extended and hooked over the rudder bar and effectually prevented Lieut. Olive reaching it. Every time Lieut. Olive released his hold on the pilot, the latter would slump forward against the control stick, and each time he hauled the pilot back and released his own hold on the stick, the airplane would go into a sharp zoom.

Finally, through almost superhuman efforts, Lieut. Olive was able to pull back the back of the pilot's seat and place Lieut. Coates in a prone position. Even then being unable to reach the rudder, he straddled Lieut. Coates' prostrate form, turning and flying the plane towards Chanute Field at 6,000 feet with the stick only, standing in this awkward position and, in addition, holding Lieut. Coates' head in his other hand near an open vent. This continued for about 45 minutes, when Lieut. Coates showed signs of reviving.

After Lieut. Coates became fairly rational, he attempted to fly the airplane, but could not regain full consciousness or sense of coordination. Lieut. Olive removed him from the pilot's seat as soon as enough strength had returned to enable him to accomplish this, and placed him in the rear compartment of the photographic plane.

With the controls at his command, Lieut. Olive flew the airplane to Chanute Field and landed. At this time Lieut. Coates had regained his normal faculties to some degree and, while still suffering tremors and nausea, was able to talk and walk to the hospital.

Upon investigation it was found that Lieut. Coates had suffered a serious attack of monoxide poisoning, due to a break in the exhaust line leading through a heater jacket, allowing exhaust gases to fill the interior of the airplane immediately behind the pilot. The photographer was not affected by the fumes, since he had been taking vertical photographs through an opening in the floor of the plane and had been breathing only fresh air.

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Practical Lessons in Flying

(*Continued from page* 46)

of the cockpit and the air pressure is against the top of the wings instead of against the bottom surface so that the wings are no longer so effective for resisting the centrifugal force as they are with the normal inside loop.

"As you can easily imagine, the pull on the safety straps is something terrific, even heavier than in an upside down flight. At the lowest point in the loop, the safety belt carries the weight of the pilot plus the centrifugal force, which with a 160 pound pilot may amount to 300 pounds or more.

"The stresses in the wing structure are also reversed, the landing wires now carrying the load intended for the flying wires in normal flight, and this also adds to the danger of the outside loop unless the bracing has been taken care of. This is all right for a good exhibition flyer but it is not for us."

Bob thought this over for a time and wondered when Ed would order him to take the stick. There was no hesitancy on Bob's part for it seemed almost ridiculously simple. He did not have to wait long before the phones sang: "All right, climb her back to 4,000 feet and try it yourself."

At the end of the climb Bob leveled off and then started on the power dive. He watched the air-speed meter climb and then pulled back on the stick just as he had seen Ed do. And then came the voice: "For the love of Mike give her the gun quick—giv'er all she's got or she will flop at the top of the hill! Go on—go on, give it to her."

Too late, and too bad. She hung for a moment and then flopped over backwards without power to complete the loop, and then Bob discovered what safety belts were for. For a moment it seemed as if he were going to slip through the straps for the shock on the harness was so severe that it nearly knocked the breath out of him. Ed took command in a moment and soon set the ship out of her nose loop and put her on an even keel. It was on and off like a flash but Bob got a good scare that lasted him for several minutes.

"Say, Bob, the next time you try to walk her up the side of a loop, give her enough gas to do the job right. You started out to do a loop but you gave the prettiest imitation of a whip stall that I've seen for a long time. But never mind, fellow, you had good intentions, even though the gas was weak. Now try it over again, but put some steam into it this time or we'll both crack our harness."

This time Bob was not going to stall, no matter what other troubles might be ahead of him. He shot her into the loop with the throttle wide open, and then pulled back on the stick. Up she zoomed like a sky-rocket, then over on her back and was about quarter way back on the return trip before he remembered to cut the engine and center the stick. The total result was that she went steaming down on a semi-power dive that threatened to jerk the life out of her, but he was careful with the stick and leveled her off very nicely. Then he received the chairman's vote of thanks as follows:

"Hot ziggity! That one was so short and tight that her tail nearly got caught in the propeller. I've been in some pretty tight loops in my time but now I know just how a squirrel feels when he loops-the-loop in his cage. I'll bet that all of the six foot stay wires are about nine feet long by this time and that the wing woodwork got the punishment of its life. But that's all right, kid, not bad at all for a beginner.

"NOW, just to complete your education in looping, I'm going to show you a sort of half loop called the 'renversement.' (Fig. 3.) This was an early war-time maneuver that started out with great promise but which was superseded by the Immelmann turn. The purpose is to rush at the enemy, giving him full benefit of your rigid machine gun, and then turn tail and run before he has time to retaliate. Just watch this and hang on tight."

Ed started out in normal flight with the motor on, gave the ship a slight dip and then pulled up the nose a trifle. Then, with the nose up, rudder and stick were applied so that the machine rolled as indicated. Ed cut the motor just before the ship was over on her back and centered the controls so as to stop the roll. Next, the stick was moved back so that she went into a dive, then the stick was quickly placed back into neutral and the engine was cut in. The ship now went into normal horizontal flight but in the opposite direction and at a considerably lower altitude.

"This is a lot more difficult than the plain loop," said Ed, because you are hanging upside down at the time when the snap is given to the controls. In this position it is difficult to judge just when the controls should be placed in neutral after rolling, hence some practice will be required before the maneuver is perfected.

"Now, I'm going to do the 'vrille turn,' a stunt very much like the renversement, but which proved much more effective in war time combat work because it was very much quicker than the renversement. Unlike the renversement, the engine is full on at all times during the maneuver. It is snappy and quick so I warn you to brace yourself so that I won't snap your head off."

In Fig. 4, we see how Ed performed the vrille turn. The stick is quickly pulled back and completely to one side while the rudder is quickly kicked full on. This causes the nose to jerk up and the ship snap rolls. The rudder is now quickly placed in neutral and the stick is neutralized shortly after, stopping the roll. If this is properly performed, little or no altitude is lost if the stick is pulled back at the end of the dive.

Bob was quite amazed at the promptness with which the ship answered the controls with the engine pulling. Up went the nose, over on her back, into the dive and then recovery before he hardly knew what happened.

"We'll just let this one lie on the ice for a time, young'un," said Ed, "for she's too quick for you now. Tomorrow we will practice the loop, and if everything goes well, we'll take a chance on the renversement. All right, set her down in front of the shack and we will do some eating—I feel that way."

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¼x⅜, ¼x½, ⅜x⅜	.02
¼x¾, ⅜x½, ⅜x⅝	.02½
⅜x¾, ½x½, ¼x⅞	.03
½x⅝, ¼x1, ½x¾	.03½
½x1, ⅝x⅝, ¼x¾	.04
⅝x1, ¾x1, ⅜x⅞	.04½
⅞x1, ¾x1⅛, ⅝x1¼	.05
1x1, ⅞x1¼, ½x1⅜	.05½
1x1¼, ⅞x1½, ½x1⅝	.06

Quotations from Customers' Letters

Ship me via express 160' aircraft Spruce in 5' lengths. The last order received from you was wonderful material. Will endeavor to send you a large order soon.—C. M. SNYDER, Lockport, Ill.

We enclose money order for $10.40 to cover material as quoted in your letter attached. We have had two previous shipments of airplane Spruce from you and are well pleased with the quality and service.—T. HOWELL, Jonesville, Mich.

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Questions and Answers

(*Continued from page 42*)

performance to any great extent is a question, but there is no reason why a cantilever biplane cannot be produced successfully.

* * *

QUESTION:—P. J. Ruben, Long Island City, L. I. *I have noticed that radial engines generally have an uneven number of cylinders—three, five, seven and nine cylinders arranged radially around in a circle. Why is it necessary to have an uneven number instead of an even number?*

Answer:—WHEN all of the cylinders act on a single crankpin it is necessary to have an uneven number so that the firing order will work out at equal intervals during two revolutions. With an odd number of cylinders, skipping a cylinder at each ignition will complete the series in two revolutions, while with an even number of cylinders acting on a single crankpin will result in "skipping" at the end of the first and second revolution.

With a nine cylinder engine the firing order will be: 1, 3, 5, 7, 9, 2, 4, 6, 8, 1, thus coming out even at the end of the second revolution. With a six cylinder we will have: 1, 3, 5, 6. The last two cylinders fire in succession instead of alternating.

By using two rows of radial cylinders with two crankthrows, we can have a total number with even numbers such as 6, 10, 14 or 18 cylinders. Thus, the six cylinder radial will consist of two three-cylinder engines side-by-side with two crankpins.

* * *

QUESTION:—John Bowers, Indianapolis, Ind. *What fluid is used in hand fire-extinguishers? Is it possible to get this fluid so that it can be used without the expensive pumps?*

Answer:—MOST fire extinguishers are filled with carbon tetrachloride, a volatile liquid that can be had from dealers in chemicals. The vapor of this fluid blankets the blaze and keeps the oxygen from the burning matter without scattering it.

* * *

QUESTION:—Jack Roberts, Ottawa, Ill. *I am writing to ask the meaning of the letters used for license numbers and preceding the numerals. Thus, what does "N" or "C" or "X" represent?*

Answer:—LICENSE numbers or identification marks or symbols are assigned to licensed and unlicensed aircraft by the Secretary of Commerce. First we have the letter "S" used for all aircraft belonging to the government or states. The letter "C" is assigned to all commercial aircraft licensed. The letter "N" precedes the license number of all aircraft engaged in foreign commerce. Licensed aircraft engaged in racing or experimental work are assigned special identification numbers or symbols while unlicensed aircraft must bear a number without a preceding symbol.

The following specimen numbers will explain just how the license and qualifying symbols are used and interpreted:

12367 = Unlicensed aircraft. No symbol prefixed.
S–34765 = Government or state owned ship.
C–78658 = Commercial ship or transport in U. S.
NC–76854 = Commercial ship in foreign trade. Can also be any commercial ship.
X56436 = Experimental, racing or other special ship.
NX–24367 = Special racer to foreign countries or as given for transatlantic flights, etc.

The letter "N" can be used as a prefix in any commercially licensed ship (as NC76854) at the option of the owner providing that it is not used for experimental work. And now we come to the suffix symbols at the end of the identification.

NC–4435Y, X–265E, NX–3425A.

In this case, the last letters or suffixes are simply a part of the number and have no particular significance so far as grades or ratings go.

* * *

QUESTION:—Gilbert J. Schrepple, Washington, N. J. *Your July issue tells of Mr. Zimmerman, a young farmer, who made a small plane motor out of a Model "T" Ford. I would like very much to get this style of rig-up. Did he use the transmission and bands? Is the propeller fastened to the crankshaft in front of the motor or on the universal?*

Answer:—PAGING Mr. Zimmerman! We have no other information available than that printed in the July issue, but hope that Mr. Zimmerman will see this request and send us more details.

However, most of these Ford conversion jobs are about the same, they couldn't be much different, and we will give you a brief outline of what is necessary.

(1) Remove transmission assembly entirely. (2) Install water circulating pump, magneto and pressure feed oil system. (3) Increase compression by shims in connecting rod ends. (4) Remove flat sides of water jacket and replace by aluminum plates. (5) Advance valve timing. (6) Change carburetor so that the engine can get some gas. (7) Sell it to the junk man.

After about 15 years as participants and witnesses of Ford conversions, we are not boosters. We have seen them take off all right and fly after a manner, very true, but between you and the lamp post, we had rather put our pennies somewhere else.

The transmission end of the crankshaft carries the propeller so that the engine stands back end foremost in the ship. This means that a special end thrust bearing should be installed to take the propeller thrust, and similar changes are made here and elsewhere until about all that is left of the original Ford is the name cast on the side.

At the best, it is very heavy and entirely unsuited for flight purposes except to exhibit your ingenuity. Motorcycle engine parts are better adapted for conversion than Ford engines.

* * *

QUESTION:—George Schmidt, Kokomo, Ind. *Do airplane propellers ever have more than two blades?*

Answer:—DURING the war it was common practice to have three or four blade propellers on the large bombers and transports, but this practice fell into disuse with the coming of the metal propeller. A four bladed propeller will transmit more power for a given diameter than a two-blade, and as the wood propellers were comparatively weak it was often necessary to reduce the circumferential speed and blade loading by the use of three or four blades.

* * *

QUESTION:—Robert S. Kent, Hollywood, Cal. *What is meant by relative motion when applied to the airplane when passing through the air?*

Answer:—WHEN a car moves over the ground its motion is said to be relative to the earth. Physically speaking, it makes no difference whether the car moves at 30 M.P.H. over the earth or whether the car stands still and the earth is pushed back past the car at the same speed for the relative motion is the same in both cases. As a matter of fact all motion is relative to some certain chosen point. A plane may move in relation to the earth and at the same time may not move at all in regard to another plane next to it in formation.

The lift of an airplane is due to the relative motion existing between the air and wing surfaces. So far as the total lift goes, it makes no difference whether the wings move in relation to still air or whether the plane stands still in relation to the earth while the wind sweeps past the wings. The relative motion between the wings and the wind is the same in both cases and the lift remains the same.

* * *

QUESTION:—P. Lupie, New York, N. Y. *An airplane flies at the rate of 55 M.P.H., and is struck by a head-on gust also travelling at 55 M.P.H. What does the plane do, stand still, lift or remain at the same altitude?*

Answer:—WE WILL assume that the speed of both the ship and the gust are taken relative to the earth. Thus, if the ship moves to the right at 55 M.P.H. while the gust travels to the left at 55 M.P.H., then the relative motion of the wings and gust will be 110 M.P.H. Under such conditions, with a doubled relative wind velocity, the ship will climb until its forward speed is reduced to zero in reference to the earth at which time it will remain at a constant altitude.

XUM

Instructors Are Queer Birds

(*Continued from page* 31)

"A loop and a couple of wingovers. I just wanted to see if you could take it. Do you feel dizzy?"

"No," I answered, "but why did you hit me with the sandbag?"

"Sandbag? I didn't use any sandbag! I just tapped your head to tell you that I was taking the controls."

If that was a "tap" I would hate to have him hit me!

As I said before, we could fly only when the wind was blowing just right. But that was not the only handicap. We flew when the instructor felt like it! Some days he just had a "hunch" not to fly; other times he would not feel in the mood. I remember one day I dashed like mad to get to the field on time. The instructor was sprawled comfortably on the grass. I stood there a few minutes and when he showed no signs of life I said, "How about it, are you going to take me up?"

"I suppose I'll have to," he drawled.

"Well, you're not doing me any favor, you know," I answered. "I'd just as soon save my money!" On the ground I could "talk back."

One day the regular instructor was away and a pilot from a nearby airport was in charge. I was the first student to have time with him. Before taking off, he showed me the signals he used and said that we would just do airwork. He took off and then handed me the controls. I flew around for awhile and awaited his corrections but none were forthcoming. I thought I must be doing pretty well and felt rather proud of myself.

When we landed the instructor paid no attention to me at all; he merely beckoned to the next student. I asked him what he thought of my flying.

"I think you had a lovely ride," was the reply.

"I did," I answered, "but how were my turns?"

"Well, you have a great deal to learn."

"I know that," I said, and walked away. I put that half hour down to profit and loss—mostly loss.

But truth will out, and I later heard that instructor's story. He had had two women students at his home field. One he never dared turn loose; the other cracked up during the first few hours of solo. So he was "off" all women fliers.

The instructor who soloed me was so temperamental that I never knew how to take him. One day he was going to make a wonderful stunt pilot of me and a few days later he said I was hopeless. All of which was probably my fault.

However, it did not make matters any easier for me. He would bawl me out so much that I got in the habit of flying the plane as I thought he wanted it done instead of the way I felt it should be done. I was flying more by fear than by feel. He had me "buffaloed," I will admit.

I soloed in a Waco with a right hand throttle. A few days later the Waco was sold and a Moth was used for student practice. That meant more dual. I had heard that the Moth climbed better than the Waco OX so I pulled her up a bit on the take-off.

Came a howl from the front cockpit. "Keep the nose down! Keep the nose down! Where in h—— do you think you're climbing, to heaven?"

I pushed the stick forward and determined to take off more gradually next time. But that did not suit either. The stick was suddenly yanked back and I heard my master's voice.

"For heaven's sake, pull her up! What do you think you're flying, the Waco?" Instructor, thy name is inconsistency!

Well, that pilot and I soon parted company—by mutual consent. He was disgusted; I was discourage. For two weeks I hung around the airport and tried to reconcile myself to the fact that I would never be a pilot.

Then instructors were changed again, and along came an army lieutenant. I told him what had happened and that I wanted him to go up with me and give me his honest opinion of my flying. If I was only going to kill myself eventually, there was no sense in my wasting my time and money.

He told me to fly anyway I wanted to and he would merely watch and keep me out of trouble. I can't tell you the joy of having someone quiet in the front cockpit. I just forgot that he was there and paid attention to what I was doing. Everything seemed to go so much easier. When we came down he said, "About a half hour more and you can take her by yourself. Come out tomorrow at twelve." Joy untold! I might be a pilot after all!

But the next day the lieutenant had to give a talk before some would-be airminded club. I guess I showed my disappointment because he said, "Listen, you don't need me. Just don't be nervous and you will be okay. A student has the plane now; when he comes back you take it up for awhile."

And so I flew for a half hour, made several bumpy landings and, much to my surprise, brought the plane and myself safely back to the hangar.

Acrobatics I learned from another lieutenant who had done a lot of flying during the war. He was the most "systematic" instructor I ever had. He would always draw a diagram and explain each maneuver before taking off so I had a pretty good idea of what I was expected to do. He would do each stunt once or twice and then I would try it. The only signal we used was touching the head when taking over the controls so I did not watch him very closely but paid more attention to the position and feel of the plane.

One day I was practicing vertical eights and I was not at all satisfied with them. Evidently the lieutenant was not either because he tapped his head. I let go of the controls. The plane started turning, then diving, then climbing and turning again. What under the sun was he trying to show

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me, I thought. He was looking at the ground first from one side of the cockpit and then from the other. He must have something picked as a pylon, I thought. I gazed out too. The plane continued diving, turning and zooming. Then we headed south and flew straight for about three minutes.

Finally my curiosity got the better of me; I pulled back the throttle and called, "What are you trying to show me?"

The instructor's head bobbed around. "Nothing," he said, "I am not flying her."

When we landed we compared notes on what had happened. I thought he had signaled for the controls (he evidently had merely adjusted his helmet or goggles); he thought I was trying to zoom some friend's house.

The pilot who taught me spins (I did not have them until long after I had soloed) had a method all his own. First he did a few and then he nodded to me to try it. When we had again straightened out he would close the throttle, pull the plane up and as we hung there at stalling point he would turn around and explain my mistakes. It made me simply furious! Not that he explained my mistakes, but that he could be turning around and talking to me while the plane was on the verge of a spin. He could hold the ship in a stall with less effort than I used to fly straight. I always came down feeling that I did not know a single thing about flying an airplane.

From all my instructors I learned something—how to fly wrong, and how to fly right. The "bawling out" taught me to fly carefully; the encouragement kept me plugging; the one who was "off women students" added a touch of comedy and incidentally put a feeling of "I'll show you" in my heart.

I always had the utmost confidence in these men and their flying ability—otherwise I never would have even taken a ride with them. And as for admiration—well, they say you always boost the doctor who pulls you through. They may have had tough pulling but they did get me through, and I'll boost everyone of them, even though they sometimes were sullen or impatient or crabby.

Instructors Are Queer Birds

(*Continued from page* 31)

shoulder and snatch it from me, the paper almost cutting my fingers.

His attitude gave me the impression I was utterly hopeless as a flier. Hoping this was not true, I again changed instructors.

Number four was very good in every way but one. He could not be depended upon. Sometimes he would keep an appointment with a student and sometimes he would not. Most of my lessons with him consisted in my pacing up and down the airport waiting for an instructor who never showed up.

My fifth instructor would all but "bite my head off" when issuing orders. His bulldog methods would make me quiver and quake while I bravely obeyed his terse orders. This nerve-wracking fear of my instructor made it an effort for me to fly at all.

I decided to change instructors once more.

This new fellow was similar to my third instructor so far as lacking patience and possessing a first-class temper was concerned. However, his heated lectures would not be confined to me alone but he would proceed to tell everyone below about it by yelling at the top of his voice. This and his sarcastic remarks would make me bristle with anger. After screaming like a mad man, he would eventually lose his voice entirely, anger choking him into stolid silence. He would anger me to such an extent that I wanted to deliberately crack up the ship and would throw it about so vengefully that sometimes it narrowly missed hitting a tree or a house at the side of the airport.

As this instructor was not helping my disposition or flying any, I made my seventh change.

He was a very good instructor, indeed, but one never knew if he was perfectly sober or not. His alcoholic or non-alcoholic condition was always a question so I began looking about for my eighth instructor.

Even if a two-way head set was used, I would not have been able to get a word in edgeways and that seems almost impossible where I am concerned. This pilot would talk from the time I climbed into the plane until I taxied to a stop upon completion of the lesson. He would talk in such a low tone of voice that my instruction period was almost entirely taken up trying to hear what he was saying. At times I would clamp both hands over my ears and duck my head far down into the cockpit, holding the stick between my knees. In this manner I was able to understand parts of that incessant jumble of words. In fact I would be so busily engaged trying to understand what he was saying that I could pay no attention to my flying—I could not even think. That monotonous rumble in my ears was most irritating and distracting.

As my repeated requests to talk louder and not so often brought no results, I left him.

The ninth instructor on the list was a most conservative flier and had all the patience in the world but he would not say a single word throughout the entire lesson. This was such a decided and surprising change as to be startling. It was with intense relief that I flew about in the old Waco. No low droning sounds issued through the speaking tubes now. However, I was making mistakes and my instructor was correcting them without a word to me. Instead of correcting and explaining my mistakes immediately when they would have done the most good, he would wait until we were on the ground before he would mention them and then only when I questioned him regarding any errors I might have made.

So I tried another pilot who I thought ought to be a capable instructor judging from his remarks on how to train a student properly. On the take-offs, I found my stick being jerked from me and yanked back much farther than I had been in the habit of doing. I would watch with breathless suspense as the nose of the ship shot skyward at a critical angle while the old OX tried valiantly to do its part. Often I would be ordered to make a turn before a safe altitude was reached and frequently, as on my take-offs, he would take over the controls and throw the ship into an almost vertical bank. Expecting momentarily to fall off into a spin and be dashed to earth made it utterly impossible for me to relax.

Knowing that I would never develop the "feel" of a ship with such a reckless pilot, I looked about for my eleventh and, what I hoped would be, my last instructor. This constant changing of instructors was by this time becoming most exasperating and considerably hindering my progress in flying. It was then with the utmost care that I selected by next instructor.

Luck was with me at last! This pilot possessed all the necessary qualities of a good instructor. He was not only an experienced and capable pilot but had that rare ability to impart his knowledge to the student in an understanding and systematic manner. He instilled confidence into me while teaching me to fly safely and sanely. He was blessed with an abundance of patience, avoiding any display of temper. I was allowed to do my own flying and an error was always corrected and explained at the time it was made. There was no continuous jumble of words coming through the speaking tube nor were there songs or bits of nonsense to claim my attention and so take my mind off flying.

Here, indeed, was the ideal instructor—a splendid example to all other pilot instructors.

Much depends upon the instructor as to what kind of pilot the student turns out to be. The instructor has a great responsibility and unless a pilot is capable of training students correctly and wisely, he should never undertake to teach anyone to fly.

For the good of aviation, let there be more good instructors and fewer of the others.

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New Type Planes

(*Continued from page* 18)

bottomless hole back of the pilot's seat. The heavier bombs are carried in racks fastened to the bottom of the plane.

Whereas a sixteen-inch shell, the heaviest artillery projectile, can hit a target only within a 23-mile range and contains 5 per cent of TNT, a bomber covers a range of 500 miles and carries a bomb containing about 50 per cent TNT. Three of the 4,000-pound bombs, which can be dropped directly on the enemy at any point within 300 miles of the base of operation, are equal to 100 of the sixteen-inch shells, which can be effective only within a 23-mile range.

The newest plane used in Army aviation is the attack plane. It is a veritable flying machine-gun nest. It swoops at more than three miles a minute upon ground troops, inflicting death and destroying the morale of the troops. The work of the attack plane is confined to this attacking upon ground troops, marching armies or ammunition trains with no aerial warfare concerning it.

Each attack plane carries six machine guns and 250 pounds of deadly fragmentation bombs. The pilot controls four of the guns from the front cockpit and the gunner manages the other two and the bombs from the rear cockpit. Because they seldom get more than a few hundred feet above the ground, the attack plane must take advantage of every ridge and tree along its route to protect it from the alert enemy.

The fragmentation bomb is new, with a super-sensitive nose which explodes with the slightest impact against any surface—even the thin fabric of an airplane wing, destroying the plane as well as the wing.

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How Not to Break In

(*Continued from page* 36)

hundred and fifty dollars. He paid me sixty five dollars and promised the rest when he sold her as he intended to when he rebuilt her.

We made a verbal agreement in which he promised the rest within a month at least. I never received the rest of it. Losing patience, I visited him and found out that he had sold the ship already, so I asked for my money. He then informed me that while he had sold the ship he had failed to receive the money for it. I asked him for the address of the man and wrote him a rather severe letter upon which he came to see me personally.

Then I found out that he had paid all but fifty dollars which amount he held as a guarantee that the motor would run fifty hours without an overhaul. As the engine conked on him a few times within three hours, he considered the fifty dollars forfeited and kept it. The first man, to whom I sold the ship, promptly went to the field and removed the prop knowing that he had no right to. This made the second buyer angry, so he swore out a warrant for arrest on a charge of grand larceny as the prop, a Curtiss Reed was worth at least a hundred and fifty dollars. The man was tried in the Police court and acquitted. At present the case is awaiting trial in the Civil court.

As for me, I had a good case against him. In the first place, my agreement with him was void for the simple reason that I was a minor. He had obtained the ship from me under the pretense that the wings were smashed when they really weren't. The man had refrained from paying me the rest of my money when he could very well have done so. The whole case is an awful mess.

In conclusion, let me give the following advice to ambitious young fellows like myself who are trying to break into the game: Don't have just enough money for a flying course and a second hand ship. You've got to have capital. Instead of taking a flying course, take a good mechanic's course which will give you a good footing. Don't try to start at the top. Get acquainted with someone in the game who has had experience and can give you sound advice. Don't attempt anything beyond your means and capacity.

Don't trust anybody and get every transaction down on paper. Keep your eyes and ears open and just use a little common sense and you'll get much further than I did. I've learned my lesson and have written this in order that others may take warning and profit by my bitter experience.

READERS

POPULAR AVIATION will be very glad to forward letters from readers direct to any aircraft manufacturer. Perhaps you were especially interested in a particular lightplane, model or glider described in this issue. Merely write a letter addressed to the manufacturer whose product interested you, asking for further particulars, send it to POPULAR AVIATION, and it will be promptly forwarded.

A Tour Through a Factory

(*Continued from page* 38)

in here. That leaves nothing to do on the ship but attach the mount, connect the instruments and gas tank, and put on the cowlings.

"Last but not least comes the Assembly Line, running up and down the central aisle. Our Assembly Line is a crude attempt at a belt, only we haven't got a belt. Instead we mount each fuselage on wheels to start with and then later, on its own landing gear, and roll them down the aisle.

"The line is divided up into ten stations. A bare fuselage starts in Station One. Every five hours it moves down a Station and another one starts in. This results in a completed ship leaving the Motor Installation Station, which is last, every five hours."

"At each station you see there are one or more mechanics and racks holding parts that go on the fuselage at that station. At twelve o'clock a bell will ring and you will see the mechanic at each station push his fuselage into the next station. It is just a few minutes of twelve now, and while we are waiting, I'll explain a little more about this.

"The entire shop is geared to this Assembly Line. Each Department Foreman knows what is needed, at which station it is needed, and when it is needed. It is his responsibility to see that the parts get there. Of course this is not so very difficult as the Foremen are careful to keep a day or so ahead. The biggest problem is keeping the line running without a hitch. Anything welded is liable to be slightly warped and it sometimes happens that a part can't be fitted into the ship in the allotted time because the place where it is supposed to go isn't quite true.

"To keep things running smoothly, the Assembly foreman has several men working in other departments that he can draw, on short notice, and put to work on just such things as that. On some jobs we install starters, which takes extra time, but since this is handled in the last station, it doesn't throw anything else out of gear. By the way, Jim, do you want a starter on your job?"

"Whoa. Wait a minute. I haven't committed myself yet, have I?"

"No, but if you don't we're going out to the field for another ride. When I get you plenty high I'm going to push a fountain pen and an order blank into your hands and you'll either sign or we'll do some upsidedown flying until you do."

"All right, Bill. Let's go into your office and get this over with while I'm all steamed up. Then we can figure out a good place to go for lunch."

Just then the twelve o'clock bell rang and we stopped to watch the Assembly Line make its shift.

Jim's next question was, "By the way, do you suppose I could get delivery this afternoon?"

Why Are Students So Dumb?

(*Continued from page 29*)

ships that happened to be "on the spot."

When you climb into the pit be sure you have your "heat" and "pressures" before you take off. I understand that you may get all hot and bothered and want to get off the ground and all that stuff, but don't overlook the fact that your power plant is the one thing that will keep you off. Think this over buddy, if you get it firmly into your brain pan, you'll live longer.

Another thing that will hold off the undertaker's bill is—inspection. Inspect your ship from nose to tail before you climb in. Treat every man as a natural born liar, when it comes to taking his word for the condition of the ship you are to fly. Don't be afraid to inspect everything.

Some of you youngsters think this inspection shows fear. What do you care. Personally I'd sooner be a live coward than a dead hero any day. Old time instructors will insist on this inspection, and if they are real old timers they'll go over the ship with you. The younger generation of inspectors have been overlooking this very important detail.

ANOTHER rookie habit is "fighting controls." If you must fight somebody take a crack at your instructor—the author feels sure he'll take care of you to the best of his ability. I'd just about be willing to bet that if all the words that have been spoken on this subject could be put end to end, their path would make several round trips to the moon. Here's how this usually starts.

You are flying along and everything's rosy. Your mind wanders off into the next county. Suddenly your wing drops, and you pull opposite stick and the wing comes up too far. You pull to the other side and before you know it you have your ship swinging like a garden gate. In other words it has a nice "pendulum" movement, and the instructor has to take the ship from you and straighten it out.

Let the wing drop a little. It usually comes up again and if it won't come up, very *little* control will do the trick. This wing drop is caused by one wing hitting a small "bump," and as soon as the obstruction has been passed the ship will fly level again.

Most of you kids never learn that a ship will fly with one wing low. It will do this little thing although it's not considered good form. If it comes to a choice of the two I'd sooner be a Chinese Ace (Wun Wing Lo) than to spend the most part of my air time fighting the stick.

Some students take months and months and months to get the meaning of the words "power torque" into their heads. This in plain English is the gyroscopic pull of the motor and propeller. Your vertical fin is supposed to correct for this, yeah—and prohibition was supposed to dry up the country.

Anything I might write here on this subject might be confusing but if you want to be able to fly a straight course talk this over with your instructor, and keep talking it over until you understand it thoroughly. Never say you understand when the subject is as clear as mud. Instructors are not mind readers.

If you have never been able to keep your ship in a straight line of flight you will probably find that old lady "power torque" is after you. The use of your foot will overcome this lady, but again I say—do it gently—it isn't polite to kick a lady hard.

Young man, if you're ever stuck on any flying problem, don't try to have it straightened out by some night watchman, or the garbage man. *Go to your instructor*—he's the man you're paying to tell you all about these things.

Did you notice I said "your" instructor. Every instructor in the flying game differs somewhat in his methods although they all arrive at the same point, and when you talk it over with another instructor you stand a good chance of never being straightened out on the question at hand. If you start with one man finish with him or prepare yourself to start all over again right from the beginning.

When you pick an instructor spend some time doing it. Look them all over. Investigate. Remember this: You must be absolutely sold on him and his ability before he can ever do you any good in the flying game. Check and double check him and when you are finally sold on him, stick to him and tell the rest of the world to go soak their heads.

You may have wondered why some of your friends who started flying the same day you did, are so far ahead of you. The answer is plain. Your friends were sold on their instructors, and you think yours should have been a bricklayer. Get that out of your head, sonny, either stick with him or tie a can to him. The motto of a student flyer should be "my instructor—be he right or wrong."

Another little big thing—don't fly mechanically. Get the feel of the air and your ship. Treat the air as something alive, and your ship as you would your best pal, and remember three little words, *heat, pressures, inspection,* are your best insurance to many flying hours.

Readers!

Why not sit down now and write us about that interesting flying experience you had the other day!

The editor is always interested in receiving yarns, photos, sketches, descriptions of flights or planes—in fact, anything connected with aviation.

Take-Off Crackups

(*Continued from page 22*)

the boards as the attempt for the record began. It reached a speed of about 20 miles an hour, then as the wheels left the boards and struck the soil runway, the wheels sank and the speed quickly dropped. A little harder spot of ground was reached and the plane began to gather speed again. As it lumbered, then waved, then skittered down the course, those on the ground began to have hopes.

But these hopes were shortlived, for as the plane reached the danger line, they saw the craft still touching its wheels and a thin streamlike vapor shortly was seen trailing back from the dump valve. Williams had gotten his signal and acted quickly, but things were not working just right. Only a few gallons had been spilled from the brimming tank when the ship reached the end of the runway. There was a slight drop in the ground there and the plane sailed over that, then the undercarriage swept into one of the elevated spur track foundations, was sheared off cleanly and came to rest a bare hundredth of a second before the rest of the ship skimmed over the ground and began to break up.

Chamberlin and Williams, miraculously unhurt, reacted in their separate ways to the terrific nerve strain of those horrible moments. Chamberlin, very white-faced, explained that at the last instant he had skidded the plane with the rudder to save Williams and himself from being crushed between motor and thousands of pounds of imprisoned gasoline. A little delay there would have meant the craft's plunging into the ground, nose first, with the huge gasoline tank ripping loose and crushing the two men like swatted flies between tanks and engine.

Williams gave vent to his released feelings by picking up a tire shorn from one wheel, sitting down on a stump, necklacing the rubber tread around his neck and owlishly quoting an advertisement—

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EDW. B. BELL, *Managing Director*

An Airy Chat With the Editor (*Continued from page 6*)

why spend the time here when you can go right ahead and read the articles and find out all about it.

However, you might be interested in knowing that "T-2003" is the disguise assumed by a member of the staff of the Chief of the Air Corps at Washington. He asks that his name be withheld, but if any of you are first class detectives you should be able to find out who he is.

This being the season of transatlantic and other long distance hops, we feel that you will find W. L. Oliver's article very timely and interesting. As we go to press, the most recent trans-Atlantic plane which failed to rise was Pangborn and Herndon's Big Bellanca. Fortunately their gasoline dump valve saved them and prevented a crash similar to those that Mr. Oliver describes.

* * *

NOW that we have told you something about this issue let's see what else has happened during the month. First off we will give the results of the Nieuport model contest which was announced in the July issue. Due to the fact that entries in this contest continued to arrive right up to the time of going to press, we did not make our final selection until the very last minute and so it was impossible, for lack of time alone, to prepare photographs of any of the prize winners for publication.

However, we are pleased to announce that the first prize consisting of $10.00 worth of model material goes to Stanley Kranc, LaCrosse, Wisconsin. The second prize of $5.00 worth of materials was won by Earl Sharpe, Little Rock, Arkansas.

The following eight model builders each receive one year's subscription to POPULAR AVIATION as a reward for the excellent workmanship they have shown in their model. George Meese, Dover, Ohio; Arnold Booth, So. Jacksonville, Fla.; Kenneth H. Burtness, Oregon, Wis.; William Winter, Jr., Bergenfield, N. J.; Hugh Smith, Chicago, Ill.; Ralph Pritchard, Mount Morris, N. Y.; John Marshall, Tulsa, Oklahoma, and Dan V. Brennan, Minneapolis, Minn.

Space will not allow us to publish the names of all those who deserve honorable mention. We can only say that we were most gratified at the uniform high quality of workmanship that was shown by nearly all the entrants.

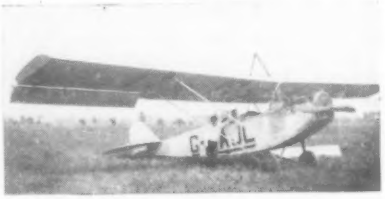
It was interesting to note that the letters of the contestants showed a preference for model plans to scale but without dimensions by almost a ten to one vote.

* * *

HERE is an interesting letter and photograph from Wilson Hammond of Montreal.

It might be interesting to the readers of POPULAR AVIATION *to hear about our activities with a Canuck, which has been rebuilt with a high wing.*

Last winter, about thirty fellows, most of whom are lightplane builders,



The rebuilt high-wing Canuck.

got together and formed a club. Each member put in ten dollars towards purchasing a plane. There was at the time an 0x5 job for sale, so this ship was bought. During the summer of 1930, it was rebuilt with a high wing, having a span of 45 feet and 6 foot chord.

The high wing reduces the landing speed down to 30 m.p.h. and also increases the stability. This monoplane weighs about 300 pounds less than the original biplane. With the engine turning 1300 r.p.m. the plane flies at 65-75 m.p.h.

Considering all expenses such as cost of instructor, hangar, field, etc., the cost of dual instruction will be approximately $4.50 per hour. Among the planes being built by the members there are, Heath "Parasols" and "Low-wings," an Alco Sportplane, and a Pietenpol "Air Camper."

* * *

There is considerable flying activity in Montreal. The Montreal Light Aeroplane Club is one of the most successful organizations of its kind and publishes a magazine which has wide distribution throughout Canada.

* * *

THE disheartening experiences of a glider club as told by R. W. Arbo last month prompted Walter Crow of Highland Park, Michigan, to write and tell us of a somewhat similar experience that his club had.

In the spring of 1929, our club began construction on a "hang-type" glider. We had the good fortune to use the high school equipment for our construction work. When we had practically finished our craft, the government placed a ban on this type.

We then started work on a Northrup PTG. We had completed the wings and were starting on the fuselage when a local manufacturer offered to sell us a completed glider at a low price. Our club then consisted of eight members and we thought it would be a good plan to enlarge. We took in several new members to help defray the cost of the glider which had been offered us. As the amount of money received in entrance fees was not sufficient, we took to making small gliders out of balsa for the youngsters. By this method, we made up the deficit and got our glider.

We then had to build a trailer, and because the glider did not perform extremely well, had to make several alterations on it. When all was completed, we faced the problem of a field.

After much searching, one was found (about 18 miles out). In order to use this field, we had to pay rent just as the airplanes which used it did. As in Mr. Arbo's case, our field was covered with hay and several times our rear flying wires became loosened because of the hay wearing out safety wires.

After surmounting these difficulties, the members finally got into the air and progressed wonderfully. Once you've had the thrill of gliding, all previous work and expense are disregarded. Our club now has twenty members with two gliders—a Northrup and a Waco PTG.

* * *

FROM Tokyo, Japan, comes an interesting letter from H. Hayashida. *My Great Popular Aviation:*

Japanese first pilot, Mr. Yoshiwara, to start off from Tokyo and went to San Francisco, over North Pacific Ocean by Junker's lightplane "Hochi Nichibei." As soon as will be to arrive in San Francisco.

I hope all the more to go close relationship of America and Japan by that flights.

We are glad to see that POPULAR AVIATION is doing its bit even in Japan to aid the cause of aviation, and we extend our greetings to Mr. Hayashida with the hope that Mr. Yoshiwara's next attempt at the Pacific crossing meets with success.

* * *

IF ANY of you fellows want a job you might try going out to Hollywood and get a job as technical aviation advisor with some of these dumb movie companies. Judging from a picture that I saw the other day you would not have to know much to get the job.

The picture started out showing a pilot and co-pilot in a tri-motored Ford transport. The plane was hopelessly lost in the fog although they were in constant radio communication with the airport. The pilot in despair took to drink and after "guzzling" a pint of gin passed out. The co-pilot immediately lost his head completely and grabbed the controls and got the ship into a spin from which he couldn't recover. To the accompanying screams of the passengers the ship crashed from a great altitude—that's certainly a great boost for aviation, don't you think?

Later on in the picture we see a pilot flying the mail in an unlicensed

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and unidentified plane that looked like nothing I ever saw before. Upon being forced down in the mountains by aerial bandits, the mail flyer radios for help and the good old Army comes to his assistance. The "U. S. Army" with much back slapping and cheers takes off in a Waco Taper-Wing with the pilot in the rear cockpit and the observer carrying a double-barreled shot gun in the front 'pit—but why go on with a recitation of all the rest of the junk that appeared in this pitiful picture?

It's a wonder to me that the public lets them get away with this stuff because they are not fooling the public—it knows too much about aviation. So, as I said before, if any of you want a good job you might go out and tell Hollywood something about aviation, and it might also be a good idea to take along some chloroform for some of the directors and producers who are under the illusion that they are producing "Epics of the Air."

* * *

THE P. A. artists are still with us. This month sees several more additions to POPULAR AVIATION'S steadily growing art gallery.

Bob Blum of Rochester, New York, sends an attractive sketch of a Fokker D-7 and an SE-5 in combat.

Louis P. Jenkins forgot to tell us where he lives, but that doesn't alter the fact that he is a mighty fine artist. He sent us a peach of a pen and ink sketch of an autogiro in flight and also a full color painting of an Albatross D-5A. Thanks, Louis.

Harold Marks of Chicago sent us a long letter and a snappy action sketch of a dog fight with Spads and Fokkers scattered all over the sky.

One of the most interesting sketches came from Runo Johnson of Brooklyn, New York. It is a three-quarter front view of an army Hawk, but instead of being an original drawing it is a blue print of the original which was made on tracing paper with all the lights and darks just reversed from the way they come out on the blue print. If you don't think that's hard, just try it yourself some time.

* * *

LAST month, you remember we announced the starting of the POPULAR AVIATION Round Robin Clubs. The idea seems to have made a hit all right but this issue is going to press so soon after the August issue appeared on the newsstands that we are not able to give you any dope on the progress of the Round Robin in this issue, but we hope to have a full column of news for next month.

In the meantime if any of you did not see the announcement on page 26 of the August issue, we can tell you briefly that the Round Robin Club is a mighty interesting means for getting acquainted with aviation fans all over the country. Those who have already sent their names in vary in age from sixteen to past forty and if you want to get in one of the groups which are now being formed, just let us know your age and your aviation interests and we will try and fit you into a congenial group that will all be interested in the same subjects as you are.

* * *

JAMES J. MORRIS, 139 Markoe Street, Philadelphia, Pa., would like to buy a pair of second hand pontoons. His only requirement is that they must be cheap.

Norvell Clarkson, Macon, Mo., has a two cylinder, air cooled 32 h.p. motor in good shape that he will sell for $25.00 or will trade for a set of built up sailplane ribs.

Incidentally, we got another letter from Norvell just a few days ago. Usually we are very modest about this kind of a letter, but this one arrived just in the middle of one of the recent hot spells we have been having and it pepped us up so that we plugged right ahead to get out an issue that would be worthy of such praise as this:

May I take a moment of your time to express my feeling toward your magazine?

Never before have I seen or heard of a magazine that will or has taken so much interest in the welfare of its subscribers. It certainly is wonderful how your editors and the rest of the people who keep the magazine going can do so much and take such an interest. It is just like a great big family. Nothing overly formal; all questions answered in good nature and in detail, and all of the readers have a say-so. I have read a number of aviation magazines, but POPULAR AVIATION *beats them all.*

In closing I wish to say that it gives me great pleasure to remit to you my two-fifty for my subscription and I say from the bottom of my heart that it is worth fully twice as much. Thank you very much for your time.

Thanks, Norvell, we are always glad to help out anybody who appreciates our feeble efforts.

* * *

CLARENCE J. P. STEIN, R. R. 1, Kutztown, Pennsylvania, writes that he has built a Rhon Ranger glider and is organizing a club. He would like to hear from other clubs or persons interested in gliding or lightplanes. At present he is starting construction on a Church Mid-Wing and he offers to build a glider or lightplane for anyone who wants one and he will guarantee that it will pass Department of Commerce requirements. Our suggestion to Clarence, if he wants to get in touch with glider or lightplane fans is that he join the Round Robin Club.

* * *

ONCE again we wish to thank all those who have made our month's work so pleasant by their interesting and welcome letters. We have tried to answer everybody, but if you did not receive a personal answer to your letter you might watch the Questions and Answers Department. Letters which are answered through that department will not be answered personally. That's that for this month. See you later.

Must a Pilot be Perfect?

(*Continued from page* 14)

called—delight in swathing this flying business in a cloak of mystery. They like to make it appear as difficult as possible—and contend a man, in order to even attempt to become a pilot, must be this and that and such and so and a lot of other silly things.

As a matter of fact—the flight surgeons will violently disagree!—any good automobile driver can become a good airplane pilot. (Bear in mind that a great many of the folks who sit behind steering wheels are **not** good drivers, even though they do manage to get along.)

If Wiley Post had lacked the dogged determination to become a first class flying man you probably never would have heard of him. He would have believed what the experts said—that a man with one eye has no business trying to fly airplanes—and devoted his time to something else. But he didn't believe them at all—and he proved they were wrong, in his own case at least, just as innumerable other pilots have proved the experts were wrong before.

As you can't tell a great military pilot by looking at him, neither can you determine in advance how good a commercial pilot a man may become—regardless of what sort of an expert you happen to be. The way a prospective pilot passes certain sets of tests, physical and mental, and the showing he makes when he is first learning to fly doesn't tell the whole story at all.

The only way to know how a man will act in a crisis is to put him in one. Unfortunately—or perhaps fortunately—this can seldom be done, but when it is done the men from whom the most is expected are often the first to fall down and those who are lightly regarded frequently come through to be heroes.

The thing that makes one doubt the value of rules and regulations and scientific methods of determining in advance which man will become a first class pilot and which man won't is this: there is no sure way to discover his courage, his common sense, his good judgment or his ability to outguess disaster when disaster looms in his path. And these are the things that make a great pilot, even more than his height, weight, skill in overhauling a motor or rigging a plane, knowledge of aerial laws or the visual acuity of his left eye.

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Look Out, Lindbergh—Here I Come

(*Continued from page* 26)

The men on a Coast Guard cutter helped him hoist his plane onto the davit of their boat. Buddy had forgotten something he needed and leaned over the side of the cutter to reach into the cockpit to get it when a swell coming down the river rocked the boat and Buddy went on over. He managed to dry off somewhat and promoted himself a ride into New London in a speedboat.

On the way the engine went dead and he volunteered to crawl out forward to see where the trouble was. As he reached the bow a "big ocean liner" as he called it, probably an excursion boat, passed and the bow of the speedboat buried itself in the wake and rose again. Buddy came up separately. The first thing the Swede who was running the boat asked was, "Did you fix the engine?"

I had wanted a ship that I could fly around in whenever I wanted, but not having too much money, I couldn't think very seriously about it. When I did get one it was quite accidental how it came about. I was over in John Hay Whitney's hangar, talking to his mechanic, Carl Schneider, not a relative of mine, but a good friend, when Whitney's secretary, Edgar Woodhams, came in.

We got to talking and he told me that he had flown during the war. He went on to say that he was doing a lot of traveling on business. The idea popped into my head that he might better be flying and I told him so: that he would spend less time than going by train and that new ships were much safer than those in which he had flown during the war. He said there was some sense to what I had told him and that he would think over the possibilities of using air transportation in his business.

A week later he was back saying he had decided to get a ship of his own. I knew of a Spartan for sale over in Westfield, so I went over and picked it up and made him a demonstration. I don't know anything about salesmanship, but I gave him the ride of his life. He bought it and took me on as pilot.

We went places and I worked in some cross-country and night-flying experience, but mostly I was giving him instruction, as he hadn't done any flying in over ten years and he had lost all sense of it. I was seventeen and he was a mere child of forty-six. I'll say I learned more about flying by teaching him than I did by doing it myself.

Carl Schneider had also had some work during the war, but he was as rusty as Woodhams. I soloed both of them, although I had less than sixty hours myself. No other instructors other than those of Roosevelt School are allowed to use Roosevelt Field, so we did our flying over at the Aviation Country Club field in Hicksville, as Whitney is a member there.

I'LL never forget one thing I saw at Hicksville. You will probably remember reading in the papers that certain members of the New York police force were detailed to aviation work. One of the cops was over at Hicksville to practice deadstick landings away from the traffic at Roosevelt. He made a nice three-point landing with his motor off. The ship didn't roll far on the ground and he got out to crank it in order to taxi over to where he could take off again. But he forgot that he cut his motor by the switch and that the gas was still full on.

When the engine caught the plane plunged at him. He ducked under the wing and tail as they went over him and then realized that the ship was liable to wind itself up in something, so off he went after it. It was quite a sight. Most of the cops were about equally successful as aviators. I've heard it explained that their feet were too big for the rudder pedals.

Another day we had quite some excitement when Woodhams came out to the hangar with about two hundred thousand dollars worth of diamonds in his pocket and proceeded to lose them. He was taking them to John Hay from a jeweler so that he could select one for the ring for his fiancee. I don't know why the jeweler let him cart them away in the old tobacco sack like Bull Durham comes in, but let me tell you that there was a mad scramble until they were found. Woodhams wasn't very much perturbed, he said they weren't good enough stones anyway and in the end they didn't use any of them.

The Spartan was built well enough, but she had a foreign motor, the Walters, which is built in Czechoslovakia, that did not have the power necessary for the ship. She would just sort of stagger up into the air and you were never quite sure she would make it although in the air she was sweet-running.

Then, too, the landing gear wasn't strong enough and would fold up. I'm not denying that Carl and I didn't use her hard. They give it out that the

(*Continued on page* 66)

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"Stand By to Bomb Mouzon"

(*Continued from page* 10)

right all the way up the valley. When Montfaucon and Romagne were behind them, Fiske made a signal to the other planes in his flight. They closed in at once and made a tight "V", for this would enable them to resist enemy planes much better. The 20th Squadron had but eight machines now; motor trouble had forced one of them to turn back.

The clouds became thicker and more annoying as they proceeded on their way. Since it was Fiske's job as leading observer to determine where the bombs should be dropped in case the real objective happened to be obscured, he peered anxiously over at the fast-flying panorama of clouds beneath.

The November wind—bitter at 14,000 feet—made the tears run from his eyes and then froze them on his cheeks. But he was hardly conscious of frozen tears; what bothered him was the difficulty of seeing the ground and their objective. He knew he must do something quickly. They were moving ahead at tremendous speed, the anti-aircraft shells were bursting near, conclusive evidence that the Germans had seen the formation. In a few moments the Fokkers would be upon them.

He couldn't see Mouzon. What should he do? Bomb Stenay? He could see a section of the city through the ragged edge of a cloud. Fiske wavered but changed his mind as the formation from the 166th Squadron continued to plow ahead. Perhaps, after all, they could see Mouzon from where they were. Opposite Mouzon, however, they wheeled about and sought another target. But when Fiske got to that spot, the clouds divided and revealed the town.

It was a splendid break for the 20th, and Fiske directed his pilot over the town. At the moment he saw Mouzon looming up in his sight, he warned the observers behind to get ready. The event they had come all this distance for was at hand. Peering intently at the sight, Fiske watched the town below ride along it until it appeared opposite the cross-bar. A tug on the lever and the bombs sailed downwards.

The formation circled now and started the homeward flight. All the airmen peered intently at the ground and watched the fires spring up where their bombs had exploded. They were gratified to see several before the clouds cut off the view.

The machines were comparatively light now and capable of making fair speed under ordinary conditions; yet they progressed but slowly, being held back by the terrific head wind.

THEY had not got far when Fiske was startled by a Fokker that bobbed up through the clouds near them. Hastily grabbing a Verys pistol, he fired a shell that threw out seven red balls of fire, the signal that enemy aircraft had been sighted. Making sure that his

comrades had seen the signal, Fiske grabbed his machine guns and watched the Fokker rush towards them.

Passing in a wide arc under the formation of American planes, it immediately made a climbing turn and buzzed up beneath the tail of Fiske's De Havilland. Here it did that great old Fokker trick of hanging on the propeller and firing point blank.

Fiske's bursts which tore through the tail of his own machine on one side also crashed into the Fokker, for the German dropped several hundred feet, recovered and came back to the battle but never close enough again to get in any effective fire.

This Fokker shooting at Fiske was not the only one. Others were giving battle to Fiske's mates in the rear of the formation, and they did not draw away until one of them was sent down in flames. The others got into formation, climbed up overhead and waited for reinforcements. Upon the arrival of these—a much larger group of Fokkers—they swooped down again to attack.

During the course of this second engagement, which was hotly contested, one Fokker was shot down. The Germans, in turn, succeeded in sending down a De Havilland in flames, the machine of Lieutenant K. G. West, pilot, and Lieutenant William Frank, observer. The Germans drew off again after setting fire to the plane, and all the Americans saw it go down, a red globe of flame shooting earthward and leaving a path of black smoke behind.

There was a momentary lull in the fight. The Americans used this to tighten up their formation but had barely done so when the battle really began in earnest. This third time the Fokkers attacked, they came in two waves from the rear. Concentrating on the last man in the formation, they forced him to dive slightly. As he did so, the observer sent one Fokker down in a tail-spin and forced another to circle out of range.

As the American plane regained its right place in the formation, the whole German squadron dived on the bombers. So intense was their fire that they riddled the motor of the rear machine, punctured the gasoline tank, shot away the controls on one side, wounded the observer and forced the plane into a nose dive, the occupants hoping to save themselves by that ruse.

Lieutenant Payne was the observer in this badly damaged rear machine, and he had a stormy time of it. He could hear the bullets hissing close to his ears as the Fokkers closed in. Then the gasoline tank was hit and the fuel escaped.

Fighting fiendishly to dislodge the Fokkers on their tail, Payne had his arm up rather high and across his chest when a bullet that was headed for his heart tore into his wrist instead and deprived him of the use of the left arm. He turned to tell Edwards, the pilot, the circumstances. Just as he did so, Edwards threw both hands up to his head. Payne concluded that Edwards had been hit.

In spite of his own bad wounds Payne grabbed the control stick in the rear seat and put the plane in a steep dive. Coming out twelve thousand feet below and two thousand feet above the ground, he felt Edwards take control of the machine and start gliding towards our lines.

Just then three Fokkers which had followed them down to make sure of the victory attacked again. Payne used what ammunition he had on the Germans, but they shot the edge off his collar and put other bullets through his clothing, never letting up until Edwards landed among the German infantry.

In the meantime the battle raged up above. Everybody had his hands full. Each time a Fokker drew off, another dived down through the clouds to carry on the attack in its place. There seemed to be no chance of either shooting or shaking them off.

FISKE'S main opponent was a black-and-white-checked Fokker that attacked most vigorously. He was within twenty-five feet as Fiske slipped his last drum of ammunition on the guns and fired short bursts into him. These dislodged him, and he dropped to the rear, content to fire at long range, not knowing that Fiske had no cartridges left and was swinging empty guns at him for effect.

While Fiske was occupied thus, the Germans succeeded in shooting down another American machine partially out of control. Every thousand feet or so on the way down Lieutenant Samuel Mandell, pilot, succeeded in getting control of his plane, only to have it go back into another spiral vrille. The last time it came out, Mandell side-slipped it to the ground and crashed near Martincourt. He was killed, but his observer, Lieutenant R. W. Fulton, was uninjured.

After Mandell was shot down, the rest of the Fokkers didn't hang on long. Dodging across the lines near Dun-sur-Meuse, the five American bombing machines that survived the flight reached their own airdrome. Thus ended the last raid of the Great War for the 20th Squadron. On the next and succeeding days the weather was too rainy to make even an attempt.

Of the six men left from the original quota of flying officers of the 20th Squadron, three were awarded the Distinguished Service Cross. Lieutenant Fiske was cited in army orders as follows:

Citation.

France, Nov. 21, 1918.

The Army Air Service Commander, First Army, cites the following officers and men for exceptional devotion to duty:

45. First Lieutenant G. H. Fiske, A. S., U. S. A., as observer of the 20th Aero Squadron, First Day Bombardment Group, participated in every raid made by the squadron in the Argonne-Meuse sector during Oct., 1918.

By order of Colonel Milling
W. C. Sherman
Lt. Col. A. S., U. S. A.
Chief of Staff.

Would You Jump?

(*Continued from page* 34)

blind flying development, and radio design, construction and communications in general, as well as development in airplanes and engines, there will be no such things as accidents, or a minimum of them anyway. That's what the trend is in air travel, to work away from the necessity of parachutes."

Yet Major Falk Harmel, the custodian of the records of the Caterpillar Club, differs. Until airplanes, pilots and fog-flying *are* actually safe, parachutes should be provided for those passengers who wish to use them, he states. They can be made comfortable and handy to don, he claims, adding that the millennium in aircraft operation has not yet arrived, and until it does the parachute should be present as an ace-in-the-hole for those who want to use it.

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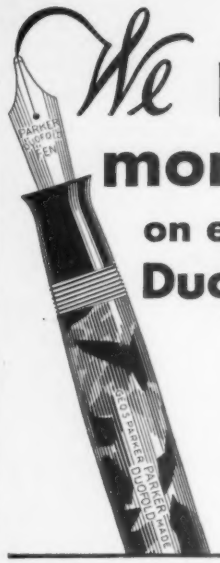

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Look Out, Lindbergh—Here I Come

(*Continued from page* 64)

Spartan won't spin. They mean she won't fall into an involuntary spin, but Carl and I wanted to see just what was what. We were up around a thousand feet, playing around and he put her in a vertical bank and then gave her bottom rudder and top aileron. We made three turns with the power on. Carl let go of the controls and she brought herself out easily, but we were right above the tree tops around the polo field.

We washed out a wing panel and smashed a prop that we had borrowed from the Siemens-Halske man, and didn't know until we had ruined it that he had borrowed it from someone else, who had it loaned to him by someone who had borrowed it from Thea Rasche, who in the meantime had gone back to Germany. It was terribly complicated and I don't know if it ever was straightened out. We painted the ship red and sold it. I found myself minus a job.

I didn't have time enough for my transport ticket and real airline work, so took what I could get, even if it was test-flying. The insurance people say it is dangerous. I am inclined to agree with them. Anyway the unforeseen can be relied on to happen.

It came about this way: a man in the wicker furniture business came to the conclusion that a Jennie's wings were no marvels of efficiency. We all knew that. The only difference was that he did something about it. He persuaded the Sikorsky factory, which makes a good wing, to build one for Jenny that would take the place of both her old ones.

By changing her from a biplane to a monoplane he hoped to change all the performance characteristics. He was right. She climbed like no one had ever seen a Jenny climb before. She was *fast*. She was controllable with one finger now where you had to fight her with two hands before. I liked her fine until I tried a whipstall. There was a crack and a bang and she shuddered all over. So did I. I worked all the controls and found them to be still operative.

I worked up nerve to try the same maneuver again. The same splintering, crashing noise came again. That was plenty for me and I came down without delay. The moment the wheels hit the ground something struck me in the back of the head. It was the door to the tool compartment, which no one had told me was loose. Why it didn't strike my head when it flew open in the air I don't know. The old crate is still over at the field though and people come over on Sunday and try to figure out what brand of airplane it is. If I am going to do any more test-flying I would just as soon do it on new planes.

I always felt sorry for Charlie Levine. He had a hangar on the field, too, but no one took him seriously. There are unpleasant things that can be said about him, as there can be about most anybody. But it took a heck of a lot of nerve for him to go across and you have got to admit that. And he did a good deal for aviation if spending money on it counts.

He had heard a lot about the ability of a group of French engineers and let them set out to design the Uncle Sam. He incidentally let himself in for a gypping. It cost him a half million dollars before he was through with them.

There are, as most people know, different wing curves. Some are best for speed, other for climb and others for general efficiency. So it is not unusual for a fine plane to embody several curves. But the Uncle Sam employed eighteen in each wing and quite a few in the fuselage, making it difficult and very costly of construction.

Most airplane builders use standard parts in many places on their machines, but everything that went into the Uncle Sam was made for that job alone. When it was finished it was a huge, heavy plane, supposed to be suitable for carrying a great load for a long distance. But there wasn't a pilot who cared to fly it.

Charlie Levine wanted Bill Stultz to fly it, but Bill didn't act interested at all as he was only offered a hundred dollars to do it. Bill could act very independent and did. He wouldn't leave the ground in it for less than a thousand. Charlie pleaded and argued but he didn't get any place. The next day he came back and said a thousand was all right. Bill wouldn't do it until he had a check. Levine gave him a check. No, it had to be certified before he would accept it. By that time it was too late to take it to the bank to have it certified and they had to wait until the next day.

Bill finally deposited the money in his account and then took it up. He was in the air just six minutes and you could see didn't like the way she handled by the way he didn't do much with her. He came down and Levine was wild. He didn't consider that the ship had been properly tested. But Bill had seen all he wanted of it and was frank about saying so.

Levine asked him if there were any changes he would advise making and Bill said, "Yes, put some more gas in the tanks and touch a match to it." I guess the way of progress is full of heartbreaks like that.

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